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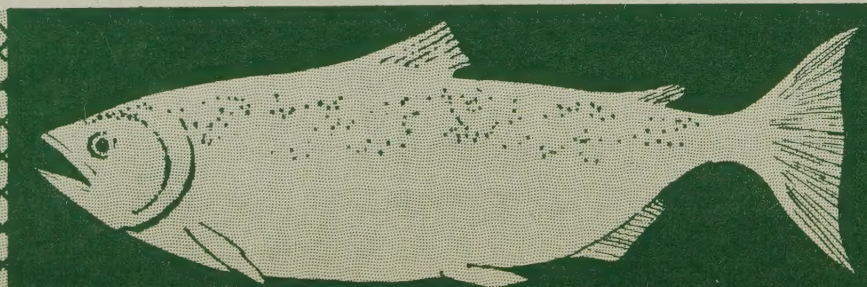
COMMERCIAL FISHERIES ABSTRACTS

UNITED STATES DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES



UNITED STATES DEPARTMENT OF THE INTERIOR
Walter J. Hickel, *Secretary*
Fred J. Russell, *Under Secretary*
Leslie L. Glasgow, *Assistant Secretary for Fish and Wildlife and Parks*

U.S. FISH AND WILDLIFE SERVICE
Charles H. Meacham, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES
Philip M. Roedel, *Director*

FOREWORD

The Department of the Interior's Bureau of Commercial Fisheries publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

Leslie L. Glasgow
Assistant Secretary for Fish and
Wildlife and Parks

0.2 (1.12)(2.143) ACOUSTIC TARGET STRENGTH OF SEVERAL SPECIES OF FISH

Volberg, H. W. (Straza Electronics, Division of Straza Industries, El Cajon, California 92021)
Special Scientific Report--Fisheries No. 607, 21-26 (June 1970)

To design fish-finding sonar equipment it is necessary to have information about target strengths of fish. This study was made principally to determine the target strength of tunas at several acoustic frequencies. In addition, measurements were made on other living, dead, fresh, and frozen fresh-water and salt-water fishes, some without swim bladders.

Summary.--1. The acoustic target strength for skipjack and yellowfin tunas, yellowtail, white crappie, and largemouth bass were measured for different orientations of the fish at frequencies from 20 kHz to 280 kHz.

2. The differences in target strength among living, dead, chilled, and frozen fish were negligible.

3. The contribution of the swim bladder to target strength decreased as size of the fish and test frequency increased.

4. With the exception of the contribution of the swim bladder, target strength was independent of frequency. [10 figures, 4 references]

Reprinted in part

0.321 EFFECTS OF TRANSITION METAL IONS ON THE EXTRACTABLE PROTEIN OF FISH MUSCLES

Castell, C. H., Barbara Smith, and Wanda Neal (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 4, 701-714 (April 1970)

Transition metal ions catalyze the oxidation of unsaturated lipids in fish with the development of rancidity. In addition, they can react with other components of the food. Proteins, peptides, amino acids, porphyrins, and other cell constituents form stable complexes with ions of transition metals. These metal ions may also bring about the formation of lipid-protein complexes when they react with phospholipids and soluble proteins. Quite likely, then, some of these metal ions may bring about changes in the solubility of fish muscle protein and, under certain conditions, may play a part in the formation of lipid-protein complexes that significantly alter the texture of the fish muscle.

In this study, the researchers demonstrated the ability of trace amounts (1-50 p.p.m.) of 12 transition metal ions to bring about changes in fish muscle protein (The changes were indicated by the decreased solubilities of the proteins in salt solution.). Furthermore, they tried to determine whether the reaction with the protein affects the capacity of the transition metal ions to catalyze the oxidation of the lipids in the fish muscle, and whether the metal-induced changes in the protein show any difference when the muscle is taken from different species of fish.

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0.321 LOW-TEMPERATURE, LONG-TIME HEATING OF BOVINE MUSCLE
1. CHANGES IN TENDERNESS, WATER-BINDING CAPACITY, pH AND AMOUNT OF WATER-SOLUBLE COMPONENTS

Laakkonen, E., G. H. Wellington, and J. W. Sherbon (Departments of Animal Science and of Food Science, Cornell University, Ithaca, New York)
Journal of Food Science 35, No. 2, 175-177 (March-April 1970)

2. CHANGES IN ELECTROPHORETIC PATTERN. Laakkonen, E., J. W. Sherbon, and G. W. Wellington. Ibid. 178-180.
3. COLLAGENOLYTIC ACTIVITY. Laakkonen, E., J. W. Sherbon, and G. W. Wellington. Ibid. 181-183.

1. The rate of cooking meat can affect its tenderness. In this study, the researchers, using well-defined conditions of low-temperature cooking, determined the relation between the tenderness of very slowly cooked beef muscle and its water-holding capacity, pH, and amount of water-soluble components. The major decrease in shear values [tenderness] occurred during the 4th to 6th hour when the meat was warming from 50° to 60° C. Losses in weight of the meat increased somewhat linearly to the 7th hour of heating, then remained fairly constant. pH values increased gradually. Uncoagulated water-soluble proteins were still present after the meat had been heated over a period of 6 hours to 60° C. Apparently, the final temperature of the meat influences its weight loss and tenderness. [5 figures, 20 references]

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0.38 (4.6)(4.5) INACTIVATION OF ENZYMES BY LINOLEIC ACID HYDROPEROXIDES AND LINOLEIC ACID

Matsushita, Setsuro, and Masayo Kobayashi (Research Institute for Food Science, Kyoto University, Kyoto, Japan), and Yuki Nitta (Kaisei Womens' College, Kobe)
Agricultural and Biological Chemistry 34, No. 6, 817-824 (June 1970)

The authors state that it has been generally accepted that the primary products of lipid autoxidation are hydroperoxides and that the inactivation of SH-enzymes and damage to cytochromes are caused by the hydroperoxides. Also, hydroperoxides are able to react with every amino acid that makes up proteins, and they oxidize or decompose biologically active compounds such as glutathione, L-ascorbic acid, vitamin A, α-tocopherol, and ATP (adenosine 5'-triphosphate). In the present work the researchers examined the inactivation of various enzymes by linoleic acid hydroperoxides (LAH) and by linoleic acid. The enzymes ribonuclease, trypsin, chymotrypsin, and pepsin were used.

Ribonuclease was inhibited by LAH; trypsin, chymotrypsin, and pepsin were inhibited by LAH and by linoleic acid. Inhibition of each enzyme occurred at different pH values. [10 figures, 32 references]

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The addition of 10 to 50 p.p.m. of certain transition metal ions rapidly decreased the extractable protein content of blended fish muscle. Cu^{++}, and Cr^{++} were most active; Sn^{++} and Cd^{++} were next. Ce^{++}, Zn^{++}, Ni^{++}, Co^{++}, Fe^{++}, Fe^{+++}, V^{++}, and Mn^{++} produced little or no change in the extractable protein nitrogen values. Lean fish were more susceptible to the metal ions than were the fatty fish or the shellfish. The metals had the least effect on scallop muscle. Fish that were badly emaciated through starvation were more susceptible to the metal-induced change than were normal individuals of the same species.

The addition of cysteine, histidine, glutamic acid, or tryptophane protected the fish muscle against metal-induced reduction of extractable protein nitrogen. The amino acids that protected the muscle of lean fish also protected it against metal-induced oxidation of the lipids: the protection (against rancidity) with fatty fish was somewhat less. The invertebrates seemed to be normally protected against both types of changes without the addition of amino acids. This natural immunity of marine invertebrate muscle to changes induced by the addition of transition metal ions may be partly due to their normally high content of free amino acids. [7 figures, 2 tables, 19 references]

0.32 HEAT DENATURATION OF BLOOD SERUM PROTEINS MEASURED IN SATURATED SODIUM CHLORIDE

Tybor, Philip T., Charles W. Dill, James N. Bryant, and Wendell A. Landmann (Department of Animal Science, Texas A&M University, College Station,77843)
Journal of Agricultural and Food Chemistry 18, No. 4, 629-631 (July-August 1970)

In order to prepare food grade products from blood proteins, we must have an understanding of the effect of heat on the denaturation of these blood serum components. Previous workers have shown that certain alterations do take place in the protein of blood serum when the serum is heated. The purpose of this study was (1) to adapt the procedure of Harland and Ashworth (1947), a turbidimetric method for the estimation of whey proteins in milk, for quantitatively measuring the denaturation of blood serum proteins and (2) to establish whether the individual bovine serum protein fractions respond uniformly to heat treatments.

The bovine serum was diluted 1 to 10 with physiological saline. The test samples were heated in a water bath at 60°, 70°, and 80° C. for 30 min. under constant agitation. The heat denatured proteins in the serum were precipitated by saturation with NaCl, filtered, and the undenatured components in the filtrates were measured tubidimetrically at 620 mμ. The response of the individual protein components to heat treatment and NaCl precipitation was determined by disc electrophoresis.

Denaturation of the bovine blood serum proteins followed a logarithmic relation to temperature and showed only a slight response to time at the temperatures used. The albumin, post albumin, transferrin, and globulin fractions showed different individual denaturation responses to heat.
[4 figures, 9 references] FTP

0.38 (4.6)(4.5) EFFECT OF LINOLEIC ACID HYDROPEROXIDES ON PEPSIN ACTIVITY

Matsushita, Setsuro, and Masayo Kobayashi (Research Institute for Food Science, Kyoto University, Kyoto, Japan)
Agricultural and Biological Chemistry 34, No. 6, 825-829 (June 1970)

In a preceding paper, the authors reported that pepsin was inactivated by linoleic acid hydroperoxides when incubated in an alkaline medium. The present paper reports on the details of the phenomenon.

Pepsin was activated by linoleic acid hydroperoxides at acidic pH values but not at pH 4.0. Activation was best at buffered pH values of 5.0 and 6.0, in which the greatest activity achieved was two times that of the original unbuffered enzyme solution. The nature of the activation phenomenon remains to be clarified.
[7 figures, 4 tables, 10 references] FTP

0.36 (3.335) FISH MUCOPOLYSACCHARIDES

Safronova, T. M., I. V. Kizevetter, and I. P. Levanidov (U.S.S.R.)
Chemical Abstracts 72, No. 21, 109952z (May 25, 1970)

0.321

2. The purpose of this part of the study was to relate changes in the electrophoretic pattern of water-soluble proteins and juices of beef muscle during low-temperature cooking to changes in tenderness, water-holding capacity, pH, and amount of water-soluble protein. Significant alterations in the myoglobins and myoalbumins occurred only after the meat was held at 60° C. The greatest changes in tenderness and in the amount of water-soluble material occurred at the same temperatures under which the slow moving proteins were denatured. The highly heat-sensitive proteins denatured before significant changes in the tenderness or water-soluble substance of the meat occurred. [4 figures, 10 references]

3. The purpose of this part of the study was to determine whether collagenolytic activity could be measured in meat and to relate any such activity to changes in bovine muscle during low-temperature cooking. The researchers found naturally occurring collagenolytic activity in the water-soluble fraction of bovine muscle. The collagenase fraction was concentrated and the concentrate could remain active in meat under long-time low-temperature cooking (<60° C.). When the beef was heated faster and to a higher internal temperature (>70°-80° C.), the collagenase was inactivated. [3 figures, 1 table, 18 references]

0.36 (0.321)(3.27)(7.3) EFFECT OF BUFFER CAPACITY ON THE MOISTURE-RETAINING ABILITY OF FISH MUSCLE TISSUE

Golovkin, N. A., and S. G. Gadzhieva (Leningrad Tekhnol. Inst. Kholod. Prom., Leningrad, U.S.S.R.)
Chemical Abstracts 72, No. 23, 120183v (June 8, 1970)

0.4 BIOLOGICAL AVAILABILITY IN ANIMALS OF IRON FROM COMMON DIETARY SOURCES

Fritz, James C., Gwendolyn W. Pla, Tallmadge Roberts, J. William Boehne, and Edwin L. Hove (Division of Nutrition, Food and Drug Administration, Department of Health, Education and Welfare, Washington, D.C. 20204)
Journal of Agricultural and Food Chemistry 18, No. 4, 647-651 (July-August 1970)

Nutritional anemia, one of the most prevalent deficiency diseases in the United States, is caused most frequently from a deficiency of iron. The U.S. Department of Agriculture (1969) estimated that, on the average, infants under 3 years of age and women under 55 years of age consume only about one-half of the recommended dietary allowance of iron. And, changing food habits in the United States have reduced the dietary intake of iron. Furthermore, the standards for enriched cereals (Code of Federal Regulations 1969) state that supplemental iron shall be a source that is harmless and assimilable, but they do not give any criteria for determining whether the iron is actually assimilable. Questions have arisen over the effectiveness (biological availability) of different iron compounds that have been used for fortification of foods. Various workers have reported that food sources of iron are less well utilized than many inorganic salts.

The purpose of this study was to make a critical evaluation of the biological availability in animals of iron from sources that are, or might be, used for fortification of animal feeds and human foods. The availability of dietary iron was determined by hemoglobin repletion technique with anemic rats and chicks (Pla and

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0.5 COMPARATIVE GROWTH OF CLOSTRIDIUM PERFRINGENS IN CARBON DIOXIDE AND NITROGEN ATMOSPHERES

Parekh, Kantilal G., and Myron Solberg (Department of Food Science, Rutgers University, The State University, New Brunswick, New Jersey 08903)
Journal of Food Science 35, No. 2, 156-159 (March-April 1970)

In 1968, 56 outbreaks (affecting 5,966 persons) of Clostridium perfringens food poisoning occurred in the United States. Because the organism is distributed widely (it is common in soil) foods for human consumption may become readily contaminated. The purpose of this study was to obtain a greater understanding of the growth characteristics of the organism. This paper reports on a comparative study of growth for eight strains of C. perfringens in a nitrogen (100%) atmosphere and in a carbon dioxide (100%) atmosphere in fluid thioglycollate medium at incubation temperature of 43° C. The headspace gas in the culture flask was monitored during the course of growth of the bacteria.

At the end of 5 hours, the nitrogen was reduced but the carbon dioxide remained at about the 100% level during the 3.5-4-hour exponential growth phase. Generation time for the strains of C. perfringens grown in 100% nitrogen atmosphere varied from 12.9 to 16.9 minutes and for those grown in 100% carbon dioxide atmosphere varied from 12.9 to 17.2 minutes. No significant difference was apparent between the individual strains grown in 100% nitrogen and 100% carbon dioxide. Singificant differences in growth rates were apparent among the eight

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0.5 INFLUENCE OF WATER ACTIVITY ON THE GROWTH OF CLOSTRIDIUM PERFRINGENS

Strong, Dorothy H., Edith F. Foster, and Charles L. Duncan (Department of Food Science, Food Research Institute, and Department of Bacteriology, University of Wisconsin, Madison 53706)
Applied Microbiology 19, No. 6, 980-987 (June 1970)

Scott (1957; 1961) defined a_w as the chemical potential of water in a solution relative to pure water at the same temperature and pressure, and indicated that it is equal to the corresponding relative humidity expressed as a fraction. a_w seems to be the most accurate means of describing the quantitation of substrate water accessible to microorganisms for growth or metabolic process. The temperature, pH, and a_w levels of food are important factors that affect the biological response of microorganisms in the food. Clostridium perfringens has been found in food products of limited water content (dried soups, sauce, mixes, and spaghetti mixes), indicating that the organism can remain viable under adverse environmental conditions. The method of handling such foods after rehydration is important to human health. The purpose of the present study was (1) to determine the limiting a_w for growth (at 37° or 46° C.) for four strains of C. perfringens type A in a complex medium, (2) to compare the effect on growth of the organism of each of three solutes (NaCl, KCl, and glucose) used to lower the a_w of the basal medium,

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0.5 EFFECT OF PROCESSING AND STORAGE CONDITIONS ON THE MICROFLORA OF CLOSTRIDIUM PERFRINGENS-INOCULATED FRANKFURTERS

Solberg, Myron, and Barbara Elkind (Department of Food Science, Rutgers University, The State University, New Brunswick, New Jersey 08903)
Journal of Food Science 35, No. 2, 126-129 (March-April 1970)

Clostridium perfringens has been implicated in a substantial number of food poisoning cases. Food poisoning strains of the organism have been isolated from cured meat products. Because the shelf-life of vacuum-packaged meat products has been extended considerably, the previously available indicators of deterioration of the foods, such as mold growth and discoloration, are no longer valid. The new packaging methods may have increased the potential public health hazards because the anaerobes or facultative anaerobes may become the predominant organisms in the microflora. Vacuum-packaged luncheon meats left out of refrigeration for several hours or days may show little if any color change even after significant microbial growth has occurred.

The purpose of the present study was to evaluate the effect of 30- to 48-minute heating cycles (the heating in modern frankfurter manufacturing procedures has been reduced to 30-50 min. followed by rapid cooling) upon the total microbial population of frankfurters and to determine the growth characteristics of C. perfringens in the cured meat product.

The heat-sensitive strain of C. perfringens inoculated into frankfurter emulsion at levels of 3,000 to 8,000 microorganisms per gram of emulsion survived the

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0.5 ABSTRACTS OF MICROBIOLOGICAL METHODS
(9.6)

Skerman, V. B. D. (ed.)
Wiley-Interscience (John Wiley & Sons Ltd., Baffins Lane, Chichester, Sussex, England), 883 pp. (n.d.) 375s
Reviewed by Anthony Rose
New Scientist 47, No. 710, 151-152 (July 16, 1970)

This book is an extensive collection of bacteriological methods that range from acetone (production of) and aesculin hydrolysis to volutin and xanthine decomposition. The entries are usually short, and the text is very comprehensive --for example, it has 27 separate entries under aesculin hydrolysis and 93 different ways of examining gelatin liquefaction. Despite this thoroughness, the author abstracted only French and English journals.

The reviewer suggests that the book is of particular value in laboratories where the work is concentrated on identification of bacteria. However, he criticizes the absence of methods that are used with microbes other than bacteria, the lack of English translations for the French entries, the want of background information on the physiological bases and limitations of the methods described, and the exorbitant price of the book. LB

0.4 MONOSODIUM GLUTAMATE: BLOOD LEVELS AND ABSORPTION AFTER ORAL AND INTRAVENOUS ADMINISTRATION

Anonymous
Nutrition Reviews 28, No. 6, 158-162 (June 1970)

This is a review paper. Glutamic acid is used as a flavor enhancer in foods. It is rapidly metabolized after ingestion. The levels of glutamic acid in the blood may vary substantially, both in animal and human subjects, after ingestion, but very large doses are required to produce high levels in most individuals. [19 references] FTP

0.6 REASSEMBLED MEAT PRODUCT

U.S. Patent 3,497,361
Wilcox, J. C., M. J. Hafstad; Armour Industrial Chemical Co. (pat.)
Food Technology 24, No. 7, 58 (July 1970)

Small, frayed chunks of meat are coated with metallic salts to form a coating of salt soluble protein. The treated chunks are then pressed to form a molded unit having the natural grain and marbling of intact meat after cooking. FTP

0.5 (0.6) SYMPOSIUM ON MICROBIALLY INDUCED FLAVORS AND FERMENTED FOODS.

Journal of Agricultural and Food Chemistry 18, No. 4, 557 ff. (July-August 1970)

"Introduction," by Seitz, E. W. (International Flavors and Fragrances, Union Beach, New Jersey 07735). p. 557.

The papers in the symposium review the state of knowledge of flavor production in foods by microorganisms and their enzymes. The areas of dairy, sausage, fish, bread, and oriental food products are discussed. The chemical changes induced by microorganisms in foods are varied and complex. Most of the changes are a result of the attempt by the organisms to sustain life in the food, but some of the changes also occur after the organism dies and its intracellular enzymes are released into the food. The following papers were presented at the symposium.

"Microbially Induced Flavors and Fermented Foods. Flavor in Fermented Dairy Products," by Sandine, William E., and Paul R. Elliker (Department of Microbiology, Oregon State University, Corvallis, Oreg. 97331). Ibid. pp. 557-562. [3 figures, 15 tables, 43 references]

"Biochemical Aspects of Flavor Development in Cheddar Cheese Slurries," by Harper, W. James, and Thorvald Kristoffersen (Department of Dairy Technology, Ohio Agricultural Research and Development Center, The Ohio State University, Columbus, Ohio 43210). Ibid. pp. 563-566. [9 figures, 1 table, 14 references]

"Production of Blue Cheese Flavor Via Submerged Fermentation by Penicillium roqueforti," by Nelson, John H. (Dairyland Food Laboratories, Inc., Waukesha, Wis. 53186). Ibid. pp. 567-569. [12 references]

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0.6 THE MECHANISM OF HEAT INITIATED BINDING OF POULTRY MEAT

Vadehra, D. V., and R. C. Baker (New York State College of Agriculture, Cornell University, Ithaca, New York 14850)
Food Technology 24, No. 7, 42, 51, 54-55 (July 1970)

The authors review information on the effects on binding of pieces or chunks of poultry meat of kind of meat, type of tissue, physical action, chemicals, pH, enzymes, types of fats, and poultry skin. Binding, for the purpose of this paper, was defined as "the knitting of chunks of meat to produce a unit system." Binding capacity of food ingredients is an important consideration in the manufacture of molded food products such as sausages and loaves.

The binding of pieces of meat appears to be related to or to involve: (1) water-holding capacity of meat, (2) disruption and breakage of cells, (3) the release of intracellular material, and (4) myofibrillar and connective tissue proteins. [32 references]

0.6 (6.54) BLAND, SOLUBLE WHEY PROTEIN CONCENTRATE HAS EXCELLENT NUTRITIONAL PROPERTIES

Wingerd, Winston H. (Industrial Food Products, Borden Inc., P.O. Box 533, Elgin, Illinois 60120), Sidney Saperstein (Pharmaceutical Products, Borden Inc., 350 Madison Ave., New York, N.Y. 10017), and Leo Lutwak (Graduate School of Nutrition, Cornell University, Ithaca, N.Y. 14850)
Food Technology 24, No. 7, 34, 36-37, 40 (July 1970)

Denatured proteins of cheese whey (lactalbumen) have been commercially available for years. The product is a tan colored, insoluble, palpable powder. Although the product is highly nutritious, it has not been used widely in the preparation of foods because of its insolubility and gritty character. An undenatured form of lactalbumen is now available as a 60% protein concentrate (Canadian Patent No. 790,580). It is bland in flavor, is soluble, and is heat coagulable. It, therefore, has physical properties that are highly desirable in manufactured foods.

This paper reports on the nutritional quality (protein quality and availability of minerals) of bland, soluble, whey protein concentrate.

Typical composition of a calcium neutralized soluble whey protein concentrate is: protein (N ×6.25), 57.7%; ash, 13.3%; fat, 6.7%; lactose (by difference), 22.3%; calcium, 3.1%; and phosphorus, 3.8%. Apparently the protein and minerals of the product are completely available to humans and animals. The nutritive value of the undenatured lactalbumen in the whey protein concentrate is equivalent to that of the heat denatured form. [6 tables, 11 references]

1.01 (9.6) ANTARCTIC ECOLOGY, VOLUME ONE

Holdgate, M. W. (ed.)
Academic Press (London) (n.d.), 604 pp. 120s
Reviewed by Richard Laws
New Scientist 46, No. 707, 646, 648 (June 25, 1970)

This book contains 57 papers presented at the Second International Symposium on Antarctic Ecology (held in 1968). This first volume deals with the past environments of the Antarctic and with the marine ecosystems there. The second volume will deal with the fresh-water and terrestrial ecology.

The papers are arranged in nine sections. Each is preceded by short introductory notes that put them in perspective by drawing attention to other relevant work in the field, and each is followed by an edited discussion intended to bring out new information or point up controversial issues. Among the topics covered are the changed equilibrium in the marine system resulting from man's reduction of the stocks of krill-eating whales (Has this reduction resulted in increases in the populations of such other terminal concentrators as fish, squid, sea birds, and seals?); the basic reasons for the great differences between polar and tropical ecosystems; the productivity of the Southern Ocean; the effects of anchor ice on benthic animals; the ecology of benthic crustacea; the pelagic ecosystem associated with ice; the freezing resistance of antarctic fish; seal sonograms, diving behavior, physiology, exploitation, and population dynamics; and comparative data on arctic and antarctic marine ecosystems, fishes, seals, and birds.

0.6 SOCIO-CULTURAL BASIS OF FOOD HABITS

Lowenberg, Miriam E. (Pennsylvania State University, University Park, Pa.)
Food Technology 24, No. 7, 27-30, 32 (July 1970)

The author discusses the cultural food patterns that influence production, preparation, and consumption of foods. Because food patterns form an integral part of culture, attempts to alter a pattern, even to improve the nutritional intake, must consider the effect that the change will have on the total structure of the culture and on the lives of the separate individuals. But food habits can be changed. The author lists the four steps (Lowenberg, Todhunder, Wilson, Feeney, and Savage, 1968) that are desirable in a deliberate attempt to bring about change: (1) Those who possess the knowledge must desire to bring about a change; (2) the people whose practices need changing must be apprised that their practices need changing and be helped to understand why; (3) the people concerned must be motivated to make the change; and (4) the food must be available so that the people can make the change. [17 references] FTP

0.6 MEAT ANALOGUES FROM SOYA
(6.54)

Church, J. A. (Technological Station, Spillers Ltd., Cambridge, England)
Food Manufacture 45, No. 5, 54-56 (May 1970)

The author discusses briefly the two forms of full-fat soya flour and the methods of producing soya concentrates, soya isolates, and simulated meats. He believes that as meat prices rise more use will be made of these meatlike foods. FTP

0.5

"Bacterial Starter Cultures in Sausage Products," by Everson, Charles W., Wilson E. Danner, and Paul A. Hammes (Merck & Co., Inc., Rahway, N.J. 07065). Ibid. pp. 570-571. [7 references]

"Sufu and Lao-Chao," by Wang, Hwa L., and Clifford W. Hesseltine (Northern Regional Research Laboratory, U.S. Department of Agriculture, Peoria, Ill. 61604). Ibid. pp. 572-575. [5 figures, 8 references]

"Nutritive Value and Wholesomeness of Fermented Foods," by Van Veen, Andre G., and Keith H. Steinkraus (New York State Agricultural Experiment Station, Cornell University, Geneva, N.Y. 14456). Ibid. pp. 576-578. [2 tables, 18 references]

"Separation of the Oil and Protein Fractions in Coconut (Cocos nucifera Linn.) by Fermentation," by Puertollano, Carmen L., Julian Banzon, and Keith H. Steinkraus (College of Agriculture, University of the Philippines College, Laguna, The Philippines; Cornell University, Geneva, N.Y. 14456). Ibid. 579-584. [5 tables, 18 references]

0.6 MEAT CHIP PRODUCT

U.S. Patent 3,497,363
Fox, J. B. (pat.)
Food Technology 24, No. 7, 58 (July 1970)

Ready-to-eat meat chips are prepared by deep-fat frying thin slices of freeze-dried meat. FTP

1.01113 PLANKTON, POLLUTION AND FISH IN THE STRAIT OF GEORGIA
(9.19)(9.1)

Parsons, T. R. (Environmental Research Group, Fisheries Research Board of Canada, Nanaimo, British Columbia, Canada)
Western Fisheries 80, No. 1, 18, 20, 43-44 (April 1970)

Because of the importance of the Strait of Georgia as a commercial fishery, scientists with the Fisheries Research Board of Canada have conducted a 5-year, multidiscipline study of the area. They averaged six oceanographic surveys of the Strait each year, collecting data on the chemistry of the water and the abundance of plankton, fish larvae, and juvenile fish. In addition, they studied such areas as the Fraser River estuary and Saanich Inlet. Their primary goal was to learn as much as possible about the action of environmental factors on the early life of fish, particularly the factors that influence the abundance of plankton and its availability to the fish as food. From measurements on the concentrations of these food organisms, regulations for management of the fisheries can be evolved and predictions useful to the fishermen and the industry can be made.

Several facts that were not directly related to the original program came to light during the investigation. For example, impressive numbers of anchovy larvae were collected during the surveys. A possible resurgence of this fishery may be indicated. Along the Fraser River Delta, a potential 50,000 to 100,000 tons per year of shrimplike plankton was estimated to be available for harvesting. A protein- and oil-rich resource of this magnitude could become a rival of the U.S. brine-shrimp market, currently a multimillion dollar industry.

The author concludes by pointing out that final analyses of the data may serve as the basis for a program that will preserve the natural environment of the Strait for future generations. [2 figures] LB

0.8 REFRIGERATED PROCESSING
(0.6)

British Patent 1,179,796
Messer Griesheim G.m.b.H. (pat.)
Food Technology 24, No. 7, 58 (July 1970)

The walls of a refrigerating tunnel are sprayed with a liquid refrigerant to avoid contamination by the meat passing through the tunnel on a conveyor belt. FTP

0.8 MEAT REFRIGERATION AND DEHUMIDIFICATION
(0.6)

United States Patent 3,492,831
Mauer, D. P., D. M. Spencer; Union Carbide Corp. (pat.)
Food Technology 24, No. 7, 58 (July 1970)

Meat, refrigerated by cold vapor spray, is exposed to circulating gases for evaporation of moisture and additional cooling. FTP

1.013 (0.8)(2.2) ORGANIZATION AND ADMINISTRATION OF THE FISHING PORT OF GÜIRIA

Beattie, Norman R.
Informe Tecnico No. 8, 70 pp. (1970) (In Spanish and English)

A scheme for the development of the Port of Güiria on the Gulf of Paria to convert it into an international fishery harbour at a cost of Bs. 34 million was started in March 1968 and is expected to be completed towards the end of 1970. The work consists of the construction of two breakwaters measuring in length 1,252.04 and 808,58 meters respectively, to provide approximately 45 hectares of sheltered water. Within this area there will be quays for the discharge of national and international fishing vessels and for the servicing of these vessels, a market for the sale of fish, facilities for the temporary and long-term accommodation of fish catches, a fueling berth fed by pipe line from a nearby oil installation, an ice-producing plant and a ship repair yard. There will also be the usual electricity, water, etc., services and the necessary administration and other offices. Facilities for the accommodation of passenger traffic on a limited scale are also planned. The maximum depth of water at the entrance passage between the breakwaters is 8 meters at mean high water, and there is a tidal range of 2.5 meters. It is understood that outward a distance of 6 meters from the port structures, the designed dredged depth can be increased to 9 meters. I am informed that experiments were carried out with a model and that there should be no maintenance dredging problem within the next 5-7 years. A plan, prepared by the Ministerio de Obras Públicas, showing the proposals is attached as Appendix 6. [6 appendices]

Reprinted in part

1.85 (1.0116) CONTRIBUTIONS TO THE LIFE HISTORIES OF SEVERAL PENAEID SHRIMPS (PENAEIDAE) ALONG THE SOUTH ATLANTIC COAST OF THE UNITED STATES

Anderson, William W. (Bureau of Commercial Fisheries Biological Laboratory, Brunswick, Georgia 31520)
Special Scientific Report--Fisheries No. 605, 24 pp. (May 1970)

Shrimp, the most valuable fishery resource of the south Atlantic coast of the United States, contributed about 40 percent of the $27 million exvessel value of all fishery landings in the area in 1966. Three species of shallow-water penaeid shrimps are of greatest commercial importance: white shrimp, Penaeus setiferus; brown shrimp, P. aztecus; and pink shrimp, P. duorarum. The shrimp fishery is reviewed for trends in yield for the area as a unit, by States, and by species, for the 10-year period 1958-67. A trend toward steady decline in total shrimp landings is indicated.

This report presents size distribution, ovary development, and sex ratios of the several species of shrimp, and includes limited information on spawning season. [15 figures, 12 tables, 12 references]

from Author's abstract

1.121 (1.0112) DISTRIBUTION, APPARENT ABUNDANCE, AND SIZE COMPOSITION OF ALBACORE (THUNNUS ALALUNGA) TAKEN IN THE LONGLINE FISHERY BASED IN AMERICAN SAMOA, 1954-65

Otsu, Tamio, and Ray F. Sumida (Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii)
Fishery Bulletin 67, No. 1, 47-69 (December 1968)

Albacore is fished selectively by the fleet because it commands the highest prices at the canneries. Data from the American Samoa-based fishery are complete, therefore, only for the albacore catches. Data on the other tuna species are not analyzed. The landings of albacore in American Samoa have increased from 338 metric tons in 1954 to 15,588 metric tons in 1965. In general, the annual landings have tended to be directly proportional to the total amount of fishing effort.

Various indices of apparent abundance of albacore (catch per trip, catch per day, and catch per 100 hooks fished) are examined. The catch per unit of effort in 1954-65 showed relatively little change in terms of numbers of fish, but a rather marked downward trend in terms of weight. This decline was due largely to a decrease in the average size of the albacore. Among the possible causes for the decrease in fish size are (1) fishing ground selection, (2) decrease of older, larger fish in the stock due to fishing and natural mortalities, (3) entry into the fishery of an abundant year class, and (4) change in sex ratio of the albacore taken. [21 figures, 5 tables, 7 references]

Reprinted in part

2.06 (1.89)(3.334) COMMERCIAL POTENTIAL OF THE ALIKREUKEL, TURBO SARMATICUS, ALONG THE SW CAPE COAST

De Villiers, G. (Division of Sea Fisheries)
South African Shipping News and Fishing Industry Review 25, No. 3, 87, 89 (March 1970)

Because of the decline in stocks of abalone on South African fishing grounds, several abalone canners have been considering the use of alikreukels to supplement production. Accordingly, the Underwater Research Unit of the Division of Sea Fisheries began a series of investigations into the depth distribution, the size of the distribution area, and the population density of these mollusks in four areas between Cape Point and Cape Agulhas.

The surveys showed that Turbo sarmaticus lives in the first vertical 20 ft. of the subtidal zone at depths of between 5 and 10 ft. Such a small area of distribution hardly presages large yields. Although in one survey area, catches of more than 100 alikreukels/diver hr. were made, quite large parts of the seabed had to be covered to harvest the catch. The best results were obtained in an area that yielded about 10 kg. (edible weight)/diver hr. Even in this area, the yields do not indicate that commercial diving for alikreukel would be an economic proposition. The Division of Sea Fisheries, therefore, does not recommend the commercial exploitation of this mollusk. [1 figure, 4 tables, 1 reference]

LB

1.9 CATCHING, HANDLING AND PROCESSING EELS

Anonymous
Commercial Fishing 9; No. 2, 33, 35-36, 38, 40 (February 1970)

This article begins with an introductory section describing the male and female eel, both yellow and silver, and their life history, including size. Then it discusses, in rather complete detail, fishing methods and gear (baited traps, fyke nets, long lines, eel spears, and shore seines), live storage and transport, killing and cleaning, freezing and cold storage, smoking (including smoking preparatory to canning), the manufacture of jellied eels (including jellied eels for canning), and chemical composition. Detailed instructions are given for making and setting the gear and for processing the various kinds of product. It ends by giving two addresses to which inquiries may be sent: The Director, Torry Research Station, P.O. Box 31, 135 Abbey Road, Aberdeen, Scotland; and The Officer in Charge, Humber Laboratory, Wassand Street, Hull, England. [3 figures] LB

1.7 (9.6) SHARK STORIES

Jones, F. R. Harden (rev.)
The Natural History of Sharks
Thomas Lineweaver III and Richard H. Backus
Deutsch (London) (April 1970), 256 pp. 55s
Nature 227, No. 5254, 206 (July 11, 1970)

This book begins with a discussion of the interaction between man and sharks and ends with a chapter on shark repellents. In between, it gives a detailed account of the life history, biology, and behavior of the animals. It contains a key to family level, a glossary, a bibliography, an index, and about 50 illustrations. LB

1.0118 SEASONAL DEPTH DISTRIBUTION OF FISH IN SOUTHEASTERN LAKE MICHIGAN

Wells, LaRue (Bureau of Commercial Fisheries Biological Laboratory, Ann Arbor, Michigan 48107)
Fishery Bulletin 67, No. 1, 1-15 (December 1968)

This study is based on systematic seasonal bottom trawling between 3 and 50 fathoms (5.5 and 91.5 m.) from February to November 1964 and supplementary information from other experimental fishing at additional depths and with other gear. The seasonal depth distribution of eight common species is described, and temperature relations are discussed. Catch records for less common species are mentioned briefly. [11 tables, 11 references] From Author's abstract

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1.0159 (9.2) SOUTH VIETNAM: A FISHERY DEVELOPMENT SURVEY

Brouillard, Keith D. (Bureau of Commercial Fisheries Office of Technical Assistance, 801 - 19th Street, NW., Washington, D.C. 20006)
Commercial Fisheries Review 32, No. 6, 55-66 (June 1970)

During January through April 1970, the author made a general economic survey of the commercial fisheries of South Vietnam for the United States Agency for International Development (USAID). This report is a summary of his findings and recommendations. [7 illustrations, 2 tables] FTP

1.35 (9.6) SYNOPSIS OF BIOLOGICAL DATA ON THE CHUM SALMON, ONCORHYNCHUS KETA (WALBAUM) 1792

Bakkala, Richard G. (Bureau of Commercial Fisheries Biological Laboratory, Seattle, Washington 98102)
Circular 315, 89 pp. (March 1970) (United States Department of the Interior, U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries, Washington, D.C. 20240)

Information presented on the chum salmon includes nomenclature, taxonomy, morphology, distribution, ecology and life history, population dynamics, fishery, and protection and management. [15 figures, 51 tables, ~275 references] Author's abstract

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1.11 (1.01111) NORTHERN RANGE EXTENSION OF THE ATLANTIC MACKEREL, SCOMBER SCOMBRUS, TO BLACK ISLAND, LABRADOR

Parsons, L. S. (Fisheries Research Board of Canada Biological Station, St. John's, Newfoundland)
Journal of the Fisheries Research Board of Canada 27, No. 3, 610-163 (March 1970)

Seven hundred and eighty-five mackerel were captured in waters off southern Labrador during August 1969. This finding extends the known range of this species an additional 50 miles north--to Black Island, Labrador. The author believes that higher than usual temperatures in the inshore surface layers of the water were at least partly responsible for the unusual abundance of mackerel along the southern Labrador coast during the summer of 1969. [1 table, 12 references] FTP

2.05 (3.12) THE SENSITIVITY OF ANIMAL STRAINS OF SALMONELLA IN AUSTRALIA TO VARIOUS CHEMOTHERAPEUTIC AGENTS

Frost, A. J., and G. T. Chung (Department of Preventive Medicine, Veterinary School, University of Queensland, St. Lucia, Brisbane, Queensland 4067, Australia)
Medical Journal of Australia 1, No. 20, 1000-1002 (May 16, 1970)

The minimum inhibitory concentrations (MIC) of six antibiotics was tested on 239 strains, representing 39 serotypes, of salmonella. The effectiveness of the six is shown in the table below. The antibiotics are listed in order of effectiveness.

Chemotherapeutic agent	Minimum inhibitory concentration		Total strains inhibited
	Range (μg./ml.)	Most frequent	
Amplicillin	0.6-25.0	2.5	97.5% (at 5 μg./ml.)
Furazolidone	0.3-10.0	5.0	55%
Chloramphenicol	1.2-25	5.0	all but 1 (at 10.0 μg./ml.)
Tetracycline	2.5-25.0	10.0	all but 4 (at 10.0 μg./ml.)
Streptomycin		10.0	95% (at 50 μg./ml.)
Tylosin		1,000.0	95% (at 2,000 μg./ml.)

No strain was resistant to tetracycline or chloramphenicol, the highest MIC for each being 25 μg./ml. [1 figure, 2 tables, 11 references] LB

2.1114 (0.8) MECHANICAL BEHAVIOR OF STRANDED WIRE ROPE -- AND FEASIBILITY OF DETECTION OF CABLE FAILURE

Laura, Patricio A., and Hendrikus H. Vanderveldt (Department of Mechanical Engineering, The Catholic University of America, Washington, D.C.), and Paul G. Gaffney (U.S. Navy)
Marine Technology Society Journal 4, No. 3, 19-32 (May-June 1970)

By monitoring stress-wave emissions in the cable systems, the authors examined the elastic properties of wire ropes and the behavior of such ropes from the start of the loading cycle until total failure occurred. The ropes varied in length, material, core, and geometry. Data are presented showing such mechanical properties as load versus elongation, load versus change in diameter, initial breaking strength, reserve strength, modified Poisson's ratio, and modified modulus of elasticity.

From the results, the authors drew the following conclusions: (1) acoustic detection methods are feasible for warning of impending cable failure; (2) the rate and the intensity of stress-wave emissions will increase as the failure load is approached; (3) the type of emission depends on cable material and cable construction; (4) the length of the rope apparently has no effect on its maximum load-carrying capacity; (5) if other variables are constant, the type of construction may affect maximum load-carrying capacity appreciably; (6) the type of material affects both the reserve strength and the maximum load-carrying capacity of the rope; (7) use of friction drums often results in a reserve strength as high as 25 percent of the first-failure load and enables attainment of maximum loads almost equal to those obtained by use of swayed ends (however, the modified moduli

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2.12 (9.11)(1.84) A METHOD OF SURVEYING SCALLOP POPULATIONS FROM A SUBMERSIBLE

Caddy, J. F. (Fisheries Research Board of Canada Biological Station, St. Andrews, New Brunswick)
Journal of the Fisheries Research Board of Canada 27, No. 3, 535-549 (March 1970)

Previous attempts by various workers to estimate population densities of marine organisms from a submersible involved subjective judgments of areas and distances. If subermsibles are to be used for fisheries work, the problem of making quantitative estimates must be resolved. This paper describes a system for continuously recording from a submersible the changes in density across a population of benthic organisms. The proposed system was tried out over a population of scallops (Placopecten magellanicus) in the Northumberland Strait.

The observer registered on a chart recorder a continuous record of the scallops visible from the viewport of the submersible. At the same time a series of exposures were made by an externally mounted automatic camera. Transects up to 4 km. long were completed during each dive of the submersible. An odometer wheel towed behind the submersible provided a trace of the distance traveled. The visual counts, then, could be expressed as linear densities (numbers seen per unit of distance traveled) independently of the speed of the submersible. An estimate of the width of the visual field could be made at the known height of the submersible. With this information, the population densities (numbers seen per unit area of sea floor) could be calculated from linear density data.

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2.1121 HOW TO DESIGN AND MAKE AN OTTER BOARD

Burgess, John
Fishing News, No. 2972, 7 (May 29, 1970)

After a discussion of the size and weight of otter boards that work best under various conditions of headline and footline length and boat-towing power, the author gives detailed instructions for designing, constructing, and assembling conventional wooden otter boards bound with iron. For example, a trawl having 5-fathom headlines and 6-fathom footlines and towed by a 10- to 25-hp. boat would take 36-in. by 20-in., 52-lb. otter boards. (Experience has shown that the depth of the boards should be about 55% of the length.)

Using 1-in. larch, pine, oak, or witch-elm, make two 36-in. by 20-in. boards. Then, disregarding the top 2 in., draw vertical and horizontal lines that quarter the length and height of the boards (see figure on back of card). The extra 2 in. at the top of the boards ensures that the towing point on the brackets is below the horizontal half-way line and that the boards will cant outwards; it also lowers the rings on the reverse side so that the pull of the legs is slightly greater on the lower half of the board than on the upper half. Finally, bind the leading, bottom, and trailing edges with strips of iron measuring about 1 in. by ⅛ in. and attach heavy iron shoes. If shackles rather than legs are to be used, bore holes through the iron binding on the trailing edge an inch or two from top and bottom to take the shackles. [1 schematic]

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2.12 (2.116)(9.11) A COMPARISON BETWEEN TWO SONIC MEASURING SYSTEMS FOR DERMERSAL FISH

Dowd, R. G. (Fisheries Research Board of Canada Marine Ecology Laboratory, Bedford Institute, Dartmouth, Nova Scotia) and E. Bakken and O. Nakken (Institute of Marine Research, Bergen, Norway)
Journal of the Fisheries Research Board of Canada 27, No. 4, 737-742 (April 1970)

Two problems are involved in the use of acoustic instruments to estimate the abundance of fish. The first is to obtain reliable counts of the number of fish per unit volume detected by the echo sounder and the second is to determine the effective volume of water sampled uniquely by each sonic pulse. The present study concerned the first problem and it was carried out to compare two kinds of signal processing systems, the Digital Echo Counter and the Analog Echo Integrator. The questions to be answered were: (1) Is there a relation between systems when they are sampling signals from the same "isonified" volume? and (2) Can these signals be correlated with a count of echoes obtained from echo-sounder recordings?

The echo integrator method and the digital counter method were compared on single and schooling fish in the Lofoten area of Norway during March 1969. Good correlation was obtained between the two systems in both situations, but the slopes of the regressions of integrated values on the digital counter differed significantly between low and high density concentration of fish. Apparently the two systems treated the echo information differently, but maintained a linear relation between themselves over a wide range of counts. The authors suggest that

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2.117 67' COPPER-HULLED SHRIMPER TO TAKE PART IN 4-YEAR TEST

Anonymous
National Fisherman 51, No. 4, 4-A (August 1970)

A shrimp trawler with a hull fashioned of ¼-in. copper alloy No. 706 (90% copper, 10% nickel) is being built in Salina Cruz, Oaxaca, Mexico. She is the nucleus of a 4-yr. test program to demonstrate to marine operators the savings in maintenance costs and fuel consumption that can accrue through prevention of hull damage caused by marine growths and salt-water corrosion. Her operating costs will be compared with those of sister ships built to identical specifications except for the hull material, launched at the same time, and functioning out of the same port in the same type of service. The 67-ft. copper-nickel prototype--which represents the cooperative effort of the copper and brass industry, a Mexican builder of commercial fishing vessels, a marine architect, and a U.S. seafood corporation--has an 18-ft. 4-in. beam, a 9-ft. 6-in. depth, and a 1,765 cu. ft. hold capacity. She is being built according to American Bureau of Shipping Rules. [1 figure] LB

2.12

The author suggests that this system, with slight modification, could be used to determine the abundance of epifaunal invertebrates, demersal fish, and any other regularly occurring phenomenon on the sea floor. It is restricted in use to areas of level terrain. [5 figures, 3 tables, 28 references]

2.1473 (1.013)(1.4) ESTUDIO DE LA PESCA DEL PARGO A CORDEL EN EL ORIENTE DE VENEZUELA [LINE FISHING FOR SNAPPER IN EASTERN VENEZUELA]

Mihara, Tsunetoshi, and Agustin Brito Leon
Informe Tecnico No. 4, 10-15 (1970) (In Spanish; summary in English)

The purpose of this report is to describe the snapper fishery by boats based in Eastern Venezuela, particularly in the Cumaná and Margarita areas. It includes the number and principal details of the boats used, including crews. Also given is a description of the fishing grounds and gear used, as well as particulars of the operations carried out and the economics of the fishery, including calculations of crewmembers' and owners' shares of the profits. And finally some recommendations are made concerning special gear and the use of echosounders. [2 figures, 1 table]
Authors' summary

2.12

Further experiments should be conducted on the aggregation behavior of fish for stock estimation, including integration, counting, and fishing, to attempt to obtain a better understanding of the relation between sonic measurements and the actual numbers of fish in schools. [3 figures, 5 references]

2.1114 DESIGN OF DEEP-SEA MOORING LINES

Berteaux, H. O. (Woods Hole Oceanographic Institute, Woods Hole, Massachusetts)
Marine Technology Society Journal 4, No. 3, 33-46 (May-June 1970)

Underwater docking facilities, surface and subsurface oceanographic data-acquisition systems, and lobster-trap markers are examples of constrained floating structures. The performance of the lines that connect these structures to their anchoring point is critical and depends, at least in part, on a correct analysis of the lines' response to the static and dynamic loads imposed by gravity, currents, and waves. Also, specific environmental conditions (those leading to corrosion, fatigue, chafing, and biological attacks) and structure-deployment techniques introduce practical problems that must be recognized early in the selection of mooring components.

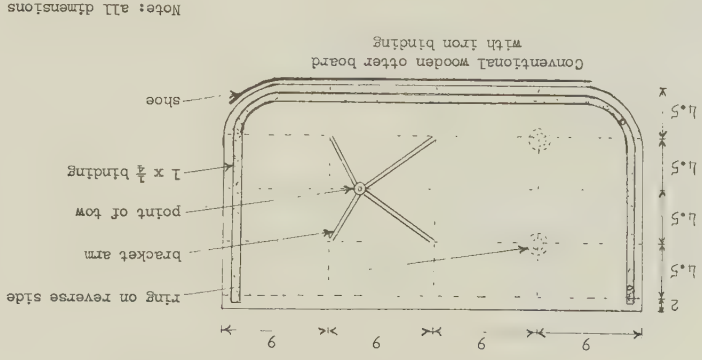
The author gives experimental data to validate his theoretical models and to reveal empirical relations. He describes methods of analysis, areas of practical problems, and results of measurements made from a number of buoy systems set in the North Atlantic. He then presents, as an example of the use of the theoretical and practical concepts examined, a case study of a single-point moored buoy set in the Gulf Stream. [11 figures, 7 tables, 10 references] LB

2.1114

of elasticity will differ by from 10 to 15 percent); (8) the Poisson's ratio of a wire rope is a measure of the looseness of construction; (9) integral dimensional stability is higher for cables with a lower Poisson's ratio; and (10) the construction geometry and the type of core affect the moduli of a wire rope.

The authors are also studying the speed of sound in wire ropes as a function of tension, internal damaging in cases of longitudinal and transverse dynamic excitation, and the effects of such variables as length and fluid flow on acoustical failure-detection methods. [7 figures, 3 tables, 16 references]

2.1121



2.143 (1.12) SONAR TARGET CLASSIFICATION EXPERIMENTS WITH A CONTINUOUS-TRANSMISSION DOPPLER SONAR

Hester, Frank J. (Bureau of Commercial Fisheries-Oceanography Center, La Jolla, California 92037)
Special Scientific Report--Fisheries No. 607, 1-20 (June 1970)

In 1961 the Inter-American Tropical Tuna Commission recognized that the stock of yellowfin tuna in the eastern tropical Pacific was in danger of being overfished and proposed a catch quota to conserve the resource. This quota could be increased if fishing for small yellowfin tuna (fish less than 20 to 25 pounds [10 kg.]) could be controlled (Inter-American Tropical Tuna Commission, 1960). It is difficult however to determine the size of the fish before it is caught, and the attempt has never been made. In addition, it is of value to the fishermen to know approximately the size of the fish before setting their nets. This information decreases the chance of catching fish so small that they "gill" in the net meshes.

Recognizing the economic and management benefits to be gained from determining the size of a fish before it is caught, the Tuna Resources Laboratory of the Bureau of Commercial Fisheries began a study to develop a shipboard sonar that could locate and classify fish schools.

A continuous-transmission sonar with very fine echo frequency discrimination was designed and constructed to study Doppler effects caused by the motion of fish as they relate to fish size and swimming characteristics. Although the equipment performed as theory predicted, difficulties with sea noise and trouble in maintaining contact with fish schools showed that commercial application of this approach

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2.9 THE SHELLFISH POISON IN TAPES PHILIPPINARUM LISCHKE

Chun, Seh Kyu, Seong Jun Kim, and Dong Suck Chang
Bull. Kor. Fish. Soc. 2, No. 2, 139-146 (1969)
Korean Scientific Abstracts 2, No. 2, 58, Abstract 70/203 (April 1970)

Incidents of poisoning caused by edible marine bivalve, Tapes philippinarum, in Kojedo, Korea, were reported in March 1968 and 1969. The results of the present investigation revealed that the incidents were caused by hemorrhagic diathesis and liver injuries, as caused by acute yellow atrophic liver.

The minimal lethal dose of the liver extract of the bivalve varied with seasons. The dose was 0.02 ml. in March and increased to 0.25 ml. in April-May 1969. After June, the extract showed no toxicity.

Phthalein reaction of smashed liver solution of the bivalve showed a great variation with seasons. In March, the values of P_1(crude solution) and P_2(boiled one) were 0.1 and 10, at its strongest toxicity. In May those of P_1 and P_2 were 1 and 1,000. However, the mouse died after intraperitoneal administration of 0.25 ml. of the liver extract at the P_2 value of 1,000. For this reason, determination of the toxicity is difficult by judging from the phthalein reaction alone.

The bivalves collected from Pusan, Kaduk, Koje, Hansan, Yeosu, Mokpo, and Kunsan were found nontoxic during April-August 1969. [10 figures, 2 tables, 9 references]

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2.6 WE CAN "EXPLODE" CANADIAN FISH USE 20% IN THREE YEARS

Anonymous
Western Fisheries 80, No. 2, 56-57 (May 1970)

Canadians eat about 15 lb. of fish per year per person; they eat about 150 lb. of meat. To find out why Canadians are so indifferent to fish, the federal and provincial governments and the fishing industry have jointly sponsored a 2-year, in-depth marketing survey in which the newest and most sophisticated techniques of market research were used. The reasons the survey team found for why some people eat fish and some don't are not new. But the recommendations they made for increasing fish consumption have novel overtones.

The team suggested that marketing strategy should differentiate between consumers who already like fish, those who are neutral, and those who dislike fish. They designed new fish products in five categories that would appeal to consumers in all three classes and considered 43 marketing concepts for processors. Four of these concepts (a line of fish sauces and seasoning mixes to be used with frozen fillets, fish recipes used in internationally known restaurants, dual-pak frozen fish dinners with everything in one package, and canned fish salads) were tested on housewives and favorably received. The team pointed out that, in a market where all kinds of appetizers are in demand, only 2% of all appetizers consist of some form of fish. Moreover, in less than 50% of the meals in which fish is the main dish is it served with anything more imaginative than lemon or ketchup; in only 32% was the product bought in frozen form.

The survey showed that the Canadian market for fish is very broad but very shallow. About 10% of the people in each income group eat fish. But, since the

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3.2345 (3.2496) THE EQUILIBRIUM WATER VAPOUR PRESSURE OF FROZEN COD

Storey, R. M., and G. Stainsby (Ministry of Technology, Humber Laboratory, Hull, England)
Journal of Food Technology 5, No. 2, 157-163 (June 1970)

The dehydration of fish in commercial cold storage probably takes place under constant-rate conditions--for a given air velocity, the rate of dehydration will depend upon the difference in equilibrium water-vapor pressure of the frozen fish and the partial pressure of the water vapor in the air. The equilibrium water-vapor pressure of frozen fish, therefore, is an important parameter for determining the rate of sublimation of ice during cold storage and the development of surface dehydration (freezer burn).

The authors found that the equilibrium water-vapor pressure of frozen cod was equal to that of ice at the same temperature. The concentration of solutes in unfrozen cod is equivalent to a 1.34% solution of NaCl (calculated from a plot of the fraction of unfrozen water remaining and the relative lowering of the vapor pressure of supercooled water to that of ice at the same temperature).
[2 figures, 19 references]

FTP

2.6

fish eaten by families with incomes of over $10,000 is not the same as that eaten by families with incomes of less than $4,000, it can be marketed as both a gourmet and a shirtsleeve item.

2.3 FISCHVERARBEITENDE INDUSTRIE: BETRIEBSHYGIENISCHE ASPEKTE
[FISH PROCESSING INDUSTRY: ASPECTS OF FACTORY HYGIENE]

Franz, E.
Ernährungswirtschaft 16, No. 8, 569-570, 572, 574 (1969)
Food Science and Technology Abstracts 2, No. 4, 577, 4R135 (April 1970)

Factory hygiene, in this discussion, means the procedures required to prevent all spoilage and consequent food poisoning. A hygiene routine adapted to specific plant conditions is recommended. [3 references] LB

3.235 THE EFFECT OF DELAY BETWEEN COOKING AND FREEZING ON THE FLAVOUR OF PRE-COOKED FROZEN FOOD

Hill, Margaret A., and G. Glew (Catering Research Unit, Procter Department of Food and Leather Science, The University, Leeds 2, England)
Journal of Food Technology 5, No. 2, 187-191 (June 1970)

We know that the nutritional and organoleptic quality of pre-cooked frozen food can be equal to or better than that of conventionally prepared food. The question arises as to whether a delay between preparation (including cooking) and freezing alters the desirable organoleptic properties of the foods after they are reheated for consumption.

Seven precooked frozen foods were tested: omelette, minced beef with onions, macaroni and cheese, poached fish, sole in white wine sauce, chicken in velouté, and brown lamb stew. The frozen foods were reheated to 80° C. immediately before being served to a taste panel.

The test showed that delays between cooking and freezing of certain frozen precooked food products of as short as 15 min. caused statistically significant differences between the organoleptic quality of such foods and that of foods frozen immediately after completion of the cooking operation (the controls). Omelettes were sensitive to delay, even for as short a time as 15 min. The organoleptic quality of macaroni and cheese frozen after a delay of only 20 min. was significantly different from that of the control. Poached fish was less sensitive, but it did show an organoleptic difference after a 60-min. delay between cooking and freezing. The remaining four products did not show significant differences in organoleptic quality after 60 min. delay between cooking and freezing. FTP
[1 table, 9 references]

2.1473 OBSERVACIONES SOBRE LA PESCA DEL TIBURÓN CON PALANGRE
(1.7)(1.013) DE FONDO EN EL ORIENTE DE VENEZUELA
[THE LONGLINE FISHERY FOR SHARKS IN EASTERN VENEZUELA]

Mihara, Tsunetoshi, and Agustin Brito Leon
Informe Tecnico No. 4, 5-9 (1970) (Fisheries Research and Development Project, Apartado 2578, Caracas, Venezuela) (In Spanish; summary in English)

The long-line fishery for sharks in Eastern Venezuela is carried out by boats of 5 to 10 gross tons carrying 5-6 man crews in the areas around Margarita Island especially off Juan Griego.

Details of hooks and anchors used as well as particulars of other gear, are given, including long-line construction, depths of waters fished, cruise logs and catches. Market prices of raw material and processing costs are also given.

The net wages paid to crew members are shown, and ways and means to increase production, together with a table containing specifications of two types of long line haulers, are proposed. [2 figures, 2 tables] Authors' summary

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2.3 FISH PROCESSING

British Patent 1,179,364
Nordischer Maschinenbau Rud Baader (pat.)
Food Technology 24, No. 7, 58 (July 1970)

This apparatus is designed to fillet fish. FTP

2.3 SHRIMP PROCESSING
(1.85)

British Patent 1,179,303
Food Technology (July 1970)
Union International Co. Ltd. (pat.)

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2.141

is unsuitable without considerable additional development work. These problems and some results are discussed, and notes on target-strength measurements of several species of fishes are included in this report. [14 figures, 4 tables, 4 references]

2.3 EINRICHTUNG ZUR ENTBARTUNG VON MUSCHELN
(1.88) [DEVICE FOR REMOVING BEARDS FROM MUSSELS]

Vermijs, P. K. M. (A. J. Vermijs-Janse)
West German Patent Application 1,454,196 (1969)
Food Science and Technology Abstracts 2, No. 4, 577, 4R130 (April 1970)

Mussels are conveyed along a track formed by several successive pairs of rollers that counter-rotate. As soon as the beards touch the rollers, they are automatically nipped off.

2.3 [REMOVAL OF MINERAL (SODIUM) SALTS FROM DIETETIC FOODS]

Viguerie, M. M. P. P.
French Patent 1,551,015 (1969)
Food Science and Technology Abstracts 2, No. 5, 622, 5G203 (May 1970)

Such foods as meats, fish and shellfish, eggs, cereals, fruits, vegetables, and processed foodstuffs are placed in an autoclave and heated to a temperature above the boiling point of water. When the heat has penetrated to the center of the food product, a valve in the autoclave is opened, causing a rapid drop in pressure. Part of the constituent water of the product is expelled, carrying with it the sodium contained in the constituent. LB

3.29 (3.23)(1.88) [EFFECT OF PROCESSING ON THE NUTRITIVE VALUE OF MUSSELS]

Korobkina, G. S., E. N. Danilova, and N. N. Kalinina (Inst. Pitaniya AMN SSR, Moscow, U.S.S.R.)
Voprosy Pitaniya 28, No. 5, 85-86 (1969)
Food Science and Technology Abstracts 2, No. 4, 575, 4R118 (April 1970)

Whole samples and samples in which the flesh and the viscera had been separated from frozen blocks of boiled Black Sea mussels were analyzed. The findings are tabulated here.

Constituent	Type of Mussel Sample		
	Whole	Flesh	Viscera
	-----percent-----		
Crude protein (N × 6.25)	15.4	15.4	14.6
Protein (protein N × 6.25)	10.1	10.8	6.5
Fat	2.3	1.7	3.9
Polyunsaturated fatty acids	0.68	0.41	1.66
Phosphatides	0.26	0.09	0.27
	-------mg./100 g.---------		
Cobalt	0.12	0.09	0.16
Manganese	0.72	0.55	0.94
Iron	52.8	---	72.9
	-percent [mg./100 g. ?]--		
Vitamin B_6	0.089	0.099	0.078
Nicotinic acid	1.63	1.61	1.61

(over)

LB

4.90 SCALLOP STEROLS ARE HYPOCHOLESTEROLEMIC RELATIVE TO CHOLESTEROL FOR THE CHICK

Idler, D. R., L. M. Safe, and G. A. MacKinnon (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia) and F. G. Proudfoot (Department of Agriculture of Canada Research Station, Kentville, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 3, 601-603 (March 1970)

Previous workers (Reiner et al., 1960; 1962) showed that marine sterols produce hypocholesterolemia in chicks. Mollusc sterols generally contain a complex sterol mixture. In this study, the authors investigated the possible hypocholesterolemic effect in chicks of the sterols from scallops. Scallops were selected for the test because they are of considerable economic significance and are eaten in large quantities.

Groups of 8-day-old chicks were fed for 14 days (1) a standard diet and (2) a standard diet supplemented with (a) scallop sterols, (b) cholesterol, and (c) scallop sterols and cholesterol. The cholesterol content of the blood of the chicks increased significantly ($P < 0.01$) when 0.5% cholesterol was incorporated into the diet and there was a possible decrease ($0.05 < P < 0.10$) when scallop sterol was fed. [2 tables, 5 references]

FTP

4.6 (4.5) ANTIOXIDANT EFFECT OF TOCOPHEROLS ON AUTOXIDATION OF MILK FAT. PART I. ANTIOXIDANT ACTIVITY OF TOCOPHEROLS IN FATTY ACID METHYLESTER OF MILK FAT

Kanno, Chouemon, Mineyuki Hayashi, Kunio Yamauchi, and Tomokichi Tsugo (Department of Agricultural Chemistry, Faculty of Agriculture, The University of Tokyo, Bunkyo-ku, Tokyo, Japan)
Agricultural and Biological Chemistry 34, No. 6, 878-885 (June 1970)

PART II. ANTIOXIDANT ACTIVITY OF TOCOPHEROLS IN THE CHURNED AND THE SOLVENT-EXTRACTED MILK FAT. Kanno, Chouemon, Kunio Yamauchi, and Tomokichi Tsugo. Ibid. 886-890.

Part I describes the activity of α-, β-, γ-, and δ-tocopherol of various concentrations in the autoxidation of the fatty acid methylester of milk fat from which the unsaponifiable matter, such as the original tocopherol, vitamin A, carotene, and cholesterol, had been removed. [6 figures, 4 tables, 17 references]

Part II reports on the antioxidant activity of d-α-, d-γ-, d-δ-tocopherols in the churned and the solvent-extracted milk fat.
[2 figures, 3 tables, 11 references]

FTP

6.54 (1.7) PREPARING FISH FLOUR FOR HUMAN CONSUMPTION FROM SHARK MEAT

Du Solier MacGregor, L., and S. Flores Cavazo
Thesis presented to Instituto Technologico y de Estudios Superiores de Monterey, Guaymas, Sonora, Mexico, 51 pp. (February 1969) (In Spanish)
World Fisheries Abstracts 21, No. 1, 45-46 (January-March 1970)

The first part of this work is a comprehensive review of the different processes of extraction utilized in the preparation of fish protein concentrate.

In the original work described here the raw material is shark meat. An abundant species commonly fished in the area of Puerto de Guaymas, Mustelus californicus, has been selected as raw material because of the following advantages: it is cheap, fat content is low, protein level is high. The disadvantages are: the meat is fibrous, the urea content is about 2 per cent.

The sharks are eviscerated and bled, after washing in cold water they are ground into pieces less than ¼ in. (6.4 mm) in size. Extraction is done in three steps as indicated by the Bureau of Commercial Fisheries. Each operation is completed with electric stirring.

In the first tank raw material is mixed into the solvent (isopropanol) and stirred during 50 min. at a temperature of 20-30° C (68-86° F). Then the solids are separated by filtration and submitted to a second extraction under stirring during 90 min. at a temperature of 75° C (167° F). After filtration the solids

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4.81 MARGARINE COMPOSITIONS

Japanese Patent 1222/70
Ono Pharmaceutical Co. Ltd. (pat.)
Food Technology 24, No. 7, 64 (July 1970)

Fatty acid monoglycerides having a linoleic acid content of more than 50% are used in the manufacture of margarine. FTP

4.81 SELECTION OF RAW MATERIALS AND FORMULATION OF THE FATTY PHASE OF MARGARINES

Toy-Riont, Roger (Raffinerie M. Toy-Riont, Marseilles, France)
Chemical Abstracts 73, No. 1, 2830b (July 6, 1970)

3.15 IRRADIATION STABILIZATION

U.S. Patent 3,493,397
Shults, G. W.; U.S. Secretary of the Navy (pat.)
Food Technology 24, No. 7, 58 (July 1970)

Partially dehydrated fresh and prepared meat items in sealed containers are sterilized by ionizing radiation. FTP

3.2383 [CONTAINER FOR POSITIONING AND PROTECTING WHOLE SHELL FISH (3.231)(1.8) FOR FREEZING]

Estere, R. (pat.)
French Patent 1,558,058 (1969)
Food Science and Technology Abstracts 2, No. 4, 483, 4F243 (April 1970)

A plastic container with one sloping end and one end wider than the other has an elastic, preferably component that both holds the shellfish in position and facilitates its removal from the container. LB

6.54

are extracted under stirring during 75 min at 75° C (167° F). The solids are dried at a temperature below 90° C (194° F) in a vacuum drier to recover the solvent.

Due to the fibrous texture of the meat the dry product is ground first to a particular size of 30 meshes and secondly at 60 meshes. The analysis of the product indicated as an average: Protein 88.9 per cent; lipids, 0.74 per cent; moisture 3.50 per cent; ashes 6.86 per cent; urea 0.00 per cent.

The product was slightly cream-white colored, odorless, practically tasteless, with an almost imperceptible taste of fish.

The yielding from the fresh fish is about 25.1 per cent. Recommendations include: trial of other solvents to remove fats, utilization of a vacuum drier, determination of amino acids and nutritive value, selection of a suitable packaging, experiments with other shark species, costs analysis at the commercial scale production, and experiments for utilization for human feeding.

4.60 FAT ANTIOXIDANTS

United States Patent 3,497,531
Sims, R. J.; Swift & Co. (pat.)
Food Technology 24, No. 7, 64 (July 1970)

Phenolic fat antioxidants, such as propyl gallate, are used to stabilize fatty, oxirane-containing compounds against loss of oxirane oxygen. FTP

3.29

Frozen blocks were prepared for canning or for the table by one of the following methods: A- defrosting, washing, blanching; B- defrosting, washing, blanching for 5 min. with steam; C- defrosting, washing, blanching for 10 min. in boiling water. Losses incurred during these processes are shown in the table at the right.

Type of loss	Amount of loss in mussels prepared by method		
	A	B	C
	percent		
Weight	15.5	13.7	28.3
Nitrogen compounds	3.6	1.6	31.3
Vitamin B_6	--	42.4	67.5
Nicotinic acid	57.6	57.6	71.9
Cobalt	16.8	50.6	49.8
Manganese	24.6	17.7	36.5

LB

4.60 FAT ANTIOXIDANTS

United States Patent 3,497,535
Lennon, W. J.; Geigy Chemical Corp. (pat.)
Food Technology 24, No. 7, 64 (July 1970)

An antioxidant and from about 0.05 to about 1,000 weight p.p.m. of esters of EDTA as chelating agents are added to fats and oils to stabilize them against oxidative deterioration. FTP

6.34 ALGINIC ACID COMPOSITIONS

British Patent 1,176,600
Adolph's Food Products Mfg. Co. (pat.)
Food Technology 24, No. 7, 68 (July 1970)

Comminuted alginic acid derivatives are tumbled in the presence of water or in a stream of water to form homogeneous granules. The granules can disperse and dissolve readily in water at room temperature.

6.34 PROTEIN CASINGS

U.S. Patent 3,494,773
Coutts, A., N. J. Bradshaw; Lever Bros. Co. (pat.)
Food Technology 24, No. 7, 58 (July 1970)

Suspensions of fibrous collagen and alginates in water are extruded into a precipitating bath to form sausage casings.

7.42 MERCURY DETERMINATION IN FISH SAMPLES BY WET DIGESTION AND FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY

Uthe, J. F., F. A. J. Armstrong, and M. P. Stainton (Fisheries Research Board of Canada Freshwater Institute, Winnipeg 19, Manitoba)
Journal of the Fisheries Research Board of Canada 27, No. 4, 805-811 (April 1970)

The authors describe a simple and rapid method for determining mercury (in parts per million) in fish. Samples of the fish are digested in sulfuric acid at 50° to 60° C. and oxidized with permanganate. The mercury in the digest is then determined by atomic absorption spectrophotometry. Recovery of mercury added to fish samples is complete, with good precision. Standard deviations (60 analyses in triplicate) were ±0.039 at the 0.1 p.p.m. level of mercury and ±0.051 at the 0.5 p.p.m. level. [5 figures, 5 references]

6.37 DIE BEDEUTUNG EINZELLIGER GRÜNALGEN FÜR DIE MENSCHLICHE ERNÄHRUNG IM KAMPFE GEGEN DEN HUNGER IN DER WELT [SIGNIFICANCE OF MONOCELLULAR GREEN ALGAE IN HUMAN NUTRITION IN THE FIGHT AGAINST HUNGER IN THE WORLD]

Stangen, F., and G. Stangen (53 Bonn-Röttgen, Lindenweg 24, Bonn, West Germany)
Ernährungs-Umschau 16, No. 9, 352-353 (1969)
Food Science and Technology Abstracts 2, No. 2, 185, Item 2G69 (February 1970)

Cooking tests showed that powdered green algae containing about 0.4 g. of digestible protein per gram can be used as a protein-enriching additive in various German foods. To meet his daily protein requirement, a person would have to eat about 30 g. of the algal powder, which costs about 0.04 DM. For enriching flours, a ratio of 1 alga to 10 flour should not be exceeded. Chocolate or condensed milk can be used to mask the green tint imparted by the algal product.
[4 references]

7.51 PURINA FIRST TO TEST HIGH-SPEED UNIT FOR ANALYZING INGREDIENT PROTEIN CONTENT

Anonymous
Feedstuffs 42, No. 30, 42 (July 25, 1970)

The traditional method of measuring protein, the Kjeldahl method, takes up to 4 hr. to complete. With a new high-speed protein analyzer that uses neutron activation, protein content in samples of ingredients can be measured in less than 15 min. Also, once the first sample has been fed into the machine, other samples can be fed in after it in a continuous series, making possible the analysis of up to 30 samples an hour.

The system works as follows. A 15-20 g. sample of the ingredient, liquid or solid, is put into a plastic capsule and sealed. The capsule is conveyed by pneumatic tube to the neutron generator, where the sample is bombarded with neutrons for 45 sec. The gamma rays emitted are a measure of the amount of nitrogen in the sample; but, since the amount of nitrogen in protein is constant, the answer that is printed out on tape is an essentially accurate measure of the protein content of the sample.

Cost of analysis by this new method is estimated at about 60¢ per sample, including the operator's salary, cost of expendable materials and maintenance, and amortization of capital equipment. Analyses by the Kjeldahl method cost from 90¢ to $1.50 per sample. The research group that has been testing the system commercially has found no danger in working with the system; previously more than half of all the laboratory accidents and injuries in the group were traceable to use

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6.37 VERFAHREN ZUR HERSTELLUNG VON QUELLMEHLKOMPOSITIONEN
[PROCESS FOR PRODUCTION OF FLOUR IMPROVERS]

Bock, W., and D. Lange (Inst. für Ernährung, Potsdam-Rehbrücke, East Germany)
East German (DDR) Patent 58,866 (1969)
Food Science and Technology Abstracts 2, No. 5, 675, 5M377 (May 1970)

Starch-containing products are mixed with untreated decolorized pectin extracts or concentrates or with pectinates, liquefied with edible acids, and dried with simultaneous hydrolysis of the starch components to form a pectin-amylose gel. Pectin-protein complexes can be varied with the framework of the maximum bonding capacity (determined by the degree of esterification of the pectin components) by addition of gelatin-, milk-, gluten-, soya bean-, or alga-based proteins; emulsifiers and vitamins can be added later. To prepare mash, malt extract is added as dilute wort. LB

6.31 FUNDAMENTAL OBSERVATIONS ON GLACILARIA CULTURE

Koh, Nam Pyo
Bull. Kor. Fish. Soc. 2, No. 2, 134-138 (1969)
Korean Scientific Abstracts 2, No. 2, 58, Abstract 70/202 (April 1970)

Experiments were carried out to assess the importance of environmental conditions upon the growth rate, length compositions, seedling and spore liberation of a red alga Glacilaria verrucosa. The alga grown in water of low salinity mixed with fresh water shows better growth rate, larger length composition, and excellent seedlings, whereas the one vegetated in an area of tidal exposure shows a somewhat retarded growth rate and poor seedlings. The rate of growth increases from August to October and begins to diminish in December continuing to diminish through February. Therefore, the spore settling time extends from May to June. Although the sun-drying method is the most efficient way of inducing spore liberation, further investigations are necessary in order to use this method for the application to artificial spore settling. [5 figures, 2 tables, 6 references]

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6.39 PIGMENT STABILITY OF LAVERS PORPHYRA TENERA KJELLMAN DURING PROCESSING AND STORAGE

Lee, Kang Ho
Bull. Kor. Fish. Soc. 2, No. 2, 105-133 (1969)
Korean Scientific Abstracts 2, No. 2, 64, Abstract 70/224 (April 1970)

The stability of three major pigments in lavers, namely chlorophylls, carotenoids, and phycobilins, during processing and storage was studied. The results of the pigment retention in fresh lavers during storage at low temperatures, of heat lability during heat treatment, and of the pigment loss during storage are summarized. [12 figures, 19 tables, 51 references]

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7.51

of the Kjeldahl method. A spokesman for the manufacturer of the equipment estimates that a neutron-activation installation will pay for itself in a year and a half or two years if it handles from 25,000 to 50,000 tons of feed annually. Fast response to protein variation in the feed ingredients could save about 1% of protein in the finished product. Since protein costs about $1.00 for 1% per ton, the saving could be substantial. The testing process does not alter the original state of the test sample. [2 photographs]

7.8 (7.9) SEROLOGICAL IDENTIFICATION OF SPECIES OF ORIGIN OF SAUSAGE MEATS

Karpas, Arthur B., Walter L. Myers, and Diego Segre (Department of Veterinary Pathology and Hygiene, College of Veterinary Medicine, University of Illinois, Urbana 61801)
Journal of Food Science 35, No. 2, 150-155 (March-April 1970)

The authors report that a simple, purified, heat-denatured serum protein used in conjunction with the sensitive tanned cell hemagglutination test could be used to identify the animal species of origin of heated meats (sausage). FTP
[4 figures, 5 tables, 23 references]

7.49 (9,19) [STUDY OF THE QUANTITATIVE EXTRACTION OF PARATHION FROM FISH AND ITS DETERMINATION BY GAS CHROMATOGRAPHY AND OTHER METHODS]

Adam, N. C., and G. S. Spyropoulos
Annales de l'Institut Phytopathologique Benaki 8, No. 4, 153-161 (1968)
Food Science and Technology Abstracts 2, No. 5, 722, 5R172 (May 1970)

Samples of homogenized cod were extracted with acetone, and the concentrated extract was purified by treatment with solvents and chromatographed on an alumina column with redistilled benzene as the eluting solvent. The conditions for measuring parathion in the extract are described.

Using a 50 g. sample, the authors could detect 0.2 p.p.m. of parathion. They used the same extract to determine parathion by thin-layer chromatography, spectrophotometry, and colorimetry. Results obtained by the different methods are presented for cases when parathion was added to the cod extracts and when it was not. [7 references] LB

6.34 [PUDDING COMPOSITIONS]

Masui, Y. (pat.)
Japanese Patent 27,708/69 (1969)
Food Science and Technology Abstracts 2, No. 5, 625, 5G224 (May 1970)

A low-temperature process for preparing alginate pudding compositions is described. LB

7.593 (1.34) CHANGE IN NUCLEIC ACID CONTENTS OF ORGANS AND TISSUES OF ONCORHYNCHUS GORBUSCHA (Walb.) AT DIFFERENT STAGES OF ITS SPAWNING MIGRATION

Berdyshev, G. D., S. I. Baranova, and G. K. Korotayev (Institute of Biologically Active Substances, Far East Branch, Siberian Division, Academy of Sciences of the U.S.S.R., Vladivostok)
Problems of Ichthyology 9, No. 1, 112-119 (1969)

The nucleic-acid content of humpback salmon in the sea just before entry into the river during spawning migration, in the rivers on the way to the spawning grounds, and after spawning was determined. Results differed with the method used to extract the nucleic acids, to calculate contents, and to express the concentration of the compounds. For example, the DNA content of fresh liver was 2.86 mg./g.; of preserved liver, 3.4 mg./g.; and of dry liver residue, 16.1 mg./g. Since these differences varied for different tissues, differences in degrees of change in water and fat metabolism in different organs and tissues of the spawning salmon are indicated.

Nucleic-acid concentrations in certain tissues and organs of the spawning salmon change appreciably. Concentration and total content of DNA in fresh gastrointestinal tract, liver, and heart decreased; in fresh kidney, muscle, brain, and gonads, they were either unchanged or slightly increased. These results point to the importance, in quantitative estimations of nucleic acids in animal organs and tissues, of the treatment to which the tissues are subjected and the method of expressing nucleic-acid contents. [5 tables, 28 references]

7.89 (9.15) USE OF ULTRAVIOLET LIGHT TO FIND PARASITIC NEMATODES IN SITU

Pippy, John H. C. (Fisheries Research Board of Canada Biological Station, St. John's, Newfoundland)
Journal of the Fisheries Research Board of Canada 27, No. 5, 963-965 (May 1970)

Certain living and dead animal tissues (including bacteria, lichens, parasitic nematodes) show visible fluorescence when exposed to ultraviolet light. This paper reports on the use of ultraviolet light to help find and identify parasitic nematodes in situ [in the natural place]. Examinations were made on external surfaces of salmon viscera and on the inner surfaces of seal stomachs.

The three species of nematodes fluoresced when exposed to ultraviolet light (360 mμ); they showed the following characteristics:

larval and adult Anisakis sp.: brilliant bluish-white
larval and adult Contracaecum aduncum: pale to bright yellow
larval Phocanema decipiens: brilliant bluish-white
adult P. decipiens: variable--pale to bright yellow to pale to bright bluish-white possible in different areas of the same specimen.

The fluorescence technique greatly facilitated search for the nematodes in situ when the organisms were not deeply imbedded in the tissue. Nematodes imbedded more than 0.5 mm. beneath the surface of the tissue were not visible with the light intensity used in these tests (15 watt).
[4 figures, 9 references]

7.9 (6.54) ESTIMATION OF BONE MATERIAL IN FISH PROTEIN CONCENTRATES

Dambergs, N., and L. W. Regier (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 3, 591-595 (March 1970)

The amount of bone material in fish protein concentrates (prepared from cod and herring) can be estimated by use of a flotation method based on the difference in densities between the bone and protein materials. The procedure is as follows. Weigh about 2 g. of fish protein concentrate into a 50- or 100-ml. beaker. Add 25 ml. of the flotation liquid mixture (80% chloroform and 20% methanol v/v) from a washing bottle. Break up any lump with a glass rod or spatula. The bone material settles to the bottom and the protein material rises to the surface. As soon as the liquid between the two layers of solids becomes clear (5 to 10 min.), decant the protein material into a 125-ml. separatory funnel. Wash down all the protein particles with flotation liquid from a washing bottle. Shake the contents of the separatory funnel and allow the material to settle for about 5 min. Add the bone material that settles in the tip of the cone to the first bone material in the beaker by quickly opening and closing the stopcock. Repeat the washing process. Decant the surplus liquid from the beaker into the funnel. Dry the bone material to a constant weight on a hot plate at a temperature of less than 50° C. under a current of air. Drying time is about 10 min. The protein material may be quantitatively recovered by filtering the material through filter paper. A single determination for bone material can be run in about 1 hr. One operator can handle at least six samples at a time. [3 tables, 6 references]

8.42 CONCENTRATIONS OF TRACE ELEMENTS IN GREAT LAKES FISHES

Lucas, Henry F., Jr. and David N. Edgington (Radiological Physics Division, Argonne National Laboratory, Argonne, Illinois 60439), and Peter J. Colby (Bureau of Commercial Fisheries Great Lakes Fishery Laboratory, Ann Arbor, Michigan 48107)
Journal of the Fisheries Research Board of Canada 27, No. 4, 677-684 (April 1970)

Although the role of trace elements in the biosphere is not fully understood, trace elements in high concentrations are toxic to living organisms. Certain trace elements at less than toxic concentrations are essential to the physiological function of particular organisms or to the ecological system. Low concentrations of trace elements may suppress physiological action. Previous workers, in studies of the relation between pollution of rivers with heavy metals and the concomitant disappearance of fish, have determined the toxicity limits of different heavy metals for a variety of species of fish. Information on the concentration of trace elements in fish from the Great Lakes has not been reported.

The purpose of this study was to: (1) identify those trace elements detectable by neutron activation and other methods of analysis, (2) establish the mean values and ranges of concentration for several trace elements in different species of fish, and (3) identify those trace elements whose concentration differs by species of fish, lake, or collection site. The elements included were those known to be toxic, those released in industrial effluents, and those considered to be hazardous in the event of an accident at a nuclear power station.

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7.89 USE OF A TITRIMETRIC METHOD TO ASSESS THE BACTERIAL SPOILAGE OF FRESH BEEF

Shelef, Leora A., and James M. Jay (Department of Biology, Wayne State University, Detroit, Michigan 48202)

Applied Microbiology 19, No. 6, 902-905 (June 1970)

Bacterial spoilage of fresh beef is determined by measuring the production of alkaline substances in the meat by bacterial spoilage organisms. Homogenates of the meat are titrated with 0.02 N HCl to a pH of 5.00 with an autotitrater. The method was tested on 23 samples of beef from a retail market. An average of 1.32 ml. of 0.02 N HCl was required to lower the pH of fresh beef homogenate to 5.00, whereas 2.58 ml. was required for the same meat at the onset of spoilage. The preliminary data indicate that beef that requires more than 2 ml. of 0.02 N HCl to lower its pH to 5.00 under the conditions of the test is in a state of incipient spoilage. [2 figures, 3 tables, 6 references] FTP

7.89 MYOGLOBIN ELECTROPHORETIC PATTERNS IN IDENTIFICATION OF MEAT FROM DIFFERENT ANIMAL SPECIES

Höyem, Tore, and Björn Thorson (Department of Food Hygiene, Veterinary College of Norway, Oslo, Norway)

Journal of Agricultural and Food Chemistry 18, No. 4, 737-739 (July-August 1970)

The authors developed a method for the identification of meat from different species of animals used for human food. Disc electrophoresis on polyacrylamide gels were used. The method is based on the migration of the myoglobin bands of the meats. The polyacrylamide gel protein patterns were sufficiently different to give a clear-cut identification of whale and horse meat in mixtures with beef. The method does not work with heated products.

[3 figures, 1 table, 17 references] FTP

7.80 [COMPARISON OF PHYSICAL METHODS FOR DETERMINING FRESHNESS OF FROZEN SEA FISH]

Todorov, I. (Diagnostichno-Profilaktichna Vet. Sta., Burgas, Bulgaria)

Veterinarnomedicinski Nauki 6, No. 9, 47-52 (1969)
Food Science and Technology Abstracts 2, No. 4, 578-579, 4R146 (April 1970)

Samples were taken from 6 to 12 batches of each of the following fish, which had been held in frozen storage at -20° C. for 1 or 2 mo.: Dentex macrophthalmus, Merluccius capensis, Trachurus trachurus, Sardinops ocellata, Scomber scombrus, Trichiurus lepturus, Merluccius bilinearis, and Hilodactilidae spp. One part of each sample (all samples were judged organoleptically perfect at the beginning of the test) was examined biochemically, bacteriologically, and organoleptically on the day of sampling; the remaining subsamples were examined in the course of 2 days' storage at from 3° to 5° C. The pH, refractive index of the aqueous humor of the eye; and the amount of tissue exudate were determined; the data are tabulated.

The authors suggest that pH may be used for assessment of freshness--a rise in pH agrees reasonably well with customary indices of deterioration. For proper evaluation, however, a combination of physico-chemical, bacteriological, and organoleptic tests is necessary. [11 references] LB

8.42

Fifteen trace elements were determined in whole fish and fish livers of species from Lakes Michigan, Superior, and Erie. The fish were alewife, lake herring, lake whitefish, bloater, round whitefish, lake trout, American smelt, goldfish, spottail shiner, trout-perch, white bass, yellow perch, and walleye.

The average concentrations of 7 elements in 19 whole fish from three species (alewife from Lake Michigan; spottail shiner from Lake Michigan and from Lake Erie; trout-perch from Lake Michigan and Lake Superior) were (in parts per billion--p.p.b.): uranium, 3; thorium, 6; cobalt, 28; cadmium, 94; arsenic, 16; chromium, 1; and copper, 1.3. The average concentrations of 8 elements in 40 samples of liver from 10 species of fish were (in p.p.b.): uranium, ~ 2; thorium, ≤2; cobalt, 40; copper, 9; zinc, 30; bromine, 0.4; arsenic, 30; and cadmium, 0.4. Other elements detected in most of the samples were (in p.p.b.): antimony, 5-100; gold, 2-5; lanthanum, 1-20; rhenium, 0.5-5; rubidium, 0.06-4; and selenium, 0.1-2.

The concentrations of trace elements in the fish varied with the species and the lake from which the fish were taken. Uranium and thorium varied with the different species of fish, but not from the same species from different lakes. The concentrations of copper, cobalt, zinc, and bromine varied little between the species and between the lakes from which the fish were taken. The level of cadmium, arsenic, and chromium varied between species and between the same species from different lakes. [3 tables, 12 references]

8.42 INORGANIC CONSTITUENTS IN MARINE ORGANISMS.
(1.8) VII. PHOTOMETRIC DETERMINATION OF NICKEL IN FLESH AND SHELL OF SHELLFISH

Nagahiro, Toru, Katsuya Uesugi, Yoshio Ishihara, and Toshiharu Murakami (Himeji Kogyo Daigaku, Himeji, Japan)

Chemical Abstracts 72, No. 19, 97723k (May 11, 1970)

8.42 MERCURY CONCENTRATIONS IN TISSUES OF FISH FROM THE SASKATCHEWAN RIVER

Wobeser, G., N. O. Nielsen, and R. H. Dunlop (Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Sask.) and F. M. Atton (Department of Natural Resources, Province of Saskatchewan, Saskatoon, Sask.)

Journal of the Fisheries Research Board of Canada 27, No. 4, 830-834 (April 1970)

The muscle tissue of 81 fish (10 species) from several locations in the Saskatchewan River system were analyzed for mercury content. All contained, on the average, more than 1.0 p.p.m. of mercury. Fish obtained at two sites had much higher concentrations--individual fish contained up to 11.2 p.p.m. of mercury. [1 table, 14 references] FTP

7.80 [OYSTER BREEDING IN ITALY AND THE POSSIBILITIES
(9.3)(1.81) OF DEVELOPING QUALITY STANDARDS]

Amato, P., and A. Luciano (Ist. Merceologia, dell'Ist. Universitario Navale di Napoles, Italy)

Rassegna Chimica 21, No. 5, 239-242 (1969)
Food Science and Technology Abstracts 2, No. 4, 578, 4R142 (April 1970)

The authors review United States, Canadian, and European quality standards for oyster size and chemical and bacteriological composition. They suggest that similar standards be adopted at the international level. [10 references] LB

8.42 (0.4) ANALYSIS OF ARSENIC AND SELENIUM IN MARINE RAW MATERIALS

Lunde, G. (Central Institute for Industrial Research, Oslo 3, Norway)
Journal of the Science of Food and Agriculture 21, No. 5, 242-247 (May 1970)

Previous work has revealed that fish contain 1 to 20 p.p.m. of arsenic and 1 to 5 p.p.m. of selenium. Arsenic appears in the lipid and in the water-soluble (nonlipid) phase; selenium appears in the nonlipid fraction. The arsenic content of ocean water is about 3 µg./kg. and the selenium content, 0.1 µg./kg. Apparently, then, these elements are accumulated in fish. No such accumulation of these elements occurs in plants or animals of terrestrial origin.

Both elements favorably influence the growth and health of domestic animals. Too low a concentration of selenium leads to serious diseases in cows and pigs. In large concentrations, selenium and arsenic have toxic effects. The degree of toxic effect depends upon the form in which these elements appear--inorganic or organic form.

Previous work also showed that the arsenic and selenium content of the water-soluble (nitrogen [N] liquor) fraction of boiled fish was higher than the water-insoluble (press cake) fraction. Arsenic appears to be in the organic state in the N liquor.

The purpose of this study was to determine the arsenic and selenium content of certain marine animals and of the N liquors produced from them (by boiling their homogenates with added distilled water), and to determine the form of these elements in the samples. The author was particularly interested to find out

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FTP

8.51 (1.89) STUDIES ON THE ORGANIC PHOSPHATES IN THE VISCERA OF AQUATIC ANIMALS. VI. ACID-SOLUBLE NUCLEOTIDES, NUCLEOSIDES AND BASES IN THE SQUID LIVER

Seki, Nobuo (Laboratory of Biochemistry, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 3, 241-245 (March 1970) (In Japanese; figure, tables, and summary in English)

Acid-soluble nucleotides, nucleosides, and bases were extracted with cold perchloric acid from the liver of squid (Ommastrephes sloani pacificus Steenstrup); separated by anion-exchange chromatography and paper chromatography; and identified by means of ultraviolet spectra, paper chromatography, and phosphate and ribose determinations. The compounds detected were adenosine mono-, di-, and triphosphate; uridine mono- and diphosphate, uridine diphosphate-N-acetylglucosamine and -N-acetylgalactosamine; inosine, cytidine, and guanosine monophosphate; guanosine diphosphate; cytydine diphosphate derivative; nicotinamide adenine dinucleotide and NAD phosphate; adenosine di- and triphosphate-ribose; nicotinamide mononucleotide; and adenine, adenosine, uracil, uridine, hypoxanthine, inosine, xanthine, guanosine, nicotinamide, and nicotinic acid. In micromoles per gram of wet weight, the content of total adenine nucleotides was from 0.5 to 0.6; of uracile nucleotides, from 0.3 to 0.6; and of pyridine nucleotides, 0.1. Uridine diphosphate-N-acetylhexosamine was predominant in the uracil nucleotides; no UDP-hexose or UDP-uronic acid was detected. The nucleotide pattern on the chromatograms was similar to the pattern given by the hepatopancreas of abalone. [1 figure, 2 tables, 18 references]

LB

8.51 (1.82)(9.13) THE EFFECT OF TEMPERATURE ON SALINITY-INDUCED CHANGES IN THE FREE AMINO ACID POOL OF MYA ARENARIA

DuPaul, William D., and Kenneth L. Webb (Virginia Institute of Marine Science, Gloucester Point, Va. 23062)
Comparative Biochemistry and Physiology 32, No. 4, 785-801 (February 15, 1970)

The authors found that the accumulation of free amino acid (FAA) and ninhydrin-positive substance (NPS) in the adductor muscle of soft-shelled clams in response to an increase in the salinity of the surrounding water was not linear with time. They propose the following three components in the process of FAA and NPS accumulation: a fast component that is active during the first 24 hours, a slow component that is effective after 36 hours, and a taurine component that is effective during the time lag between the operation of the fast and the slow components. Since the soft-shelled clam is an osmoconformer, the authors suggest that the fast component may be useful in preventing excessive tissue water loss and consequent changes in cell volume. Adductor muscle lost no significant amount of tissue water after 24-36 hr. exposure to an increase of salinity.

The high correlation between the decrease in aspartic acid concentration and the increase in alanine concentration indicates a direct relation in the formation of alanine from aspartic acid. The authors suggest that aspartic acid undergoes a decarboxylation forming alanine. The rate-temperature functions of NPS accumulation for warm- and cold-acclimated clams do not conform to those for warm- and cold-acclimated poikilotherms. [8 figures, 3 tables, 19 references]

LB

8.53 (1.80) LIPIDS AND FATTY ACIDS OF TWO SPECIES OF NORTH ATLANTIC KRILL (MEGANYCTIPHANES NORVEGICA AND THYSANOËSSA INERMIS) AND THEIR ROLE IN THE AQUATIC FOOD WEB

Ackman, R. G., C. A. Eaton, J. C. Sipos, S. N. Hooper, and John D. Castell (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 3, 513-533 (March 1970)

This article reports on the lipid and fatty acid compositions of two North Atlantic zooplanktonic Crustacea, Meganyctiphanes norvegica and Thysanoëssa inermis. The two euphausiids are plentiful in waters off Nova Scotia, Canada. Pure samples for this study were obtained from the stomachs of baleen whales. Interest in these Crustacea has developed because of their possible use in feeding hatchery fish. Variations in the composition of the body lipids of fish may influence the flavor and keeping quality of the meat; therefore, an understanding of the nature of the lipids and fatty acids of the hatchery foodstuffs is necessary to establish the characteristics of the meat products from hatchery fish. Also, an examination of the lipid classes and their fatty acid compositions should help to establish the role of M. norvegica and T. inermis in the transfer of lipids and fatty acids through the aquatic food web.

The fatty acid compositions of the phospholipids and triglycerides from two lots of M. norvegica, and of the total lipids of two additional lots of different origin, showed characteristics similar to those found in the lipids of carnivorous higher animals (such as herring). The fatty acids in the phospholipids and the triglycerides of one sample of T. inermis was quantitatively similar to those of

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FTP

8.51 FREE AMINO ACID COMPOSITION OF THE SOFT-SHELL CLAM
(1.82)(9.13) MYA ARENARIA IN RELATION TO SALINITY OF THE MEDIUM

Virkar, Raghunath A. (Newark State College, Morris Avenue, Union, New Jersey 07083) and Kenneth L. Webb (Virginia Institute of Marine Science, Gloucester Point, Va. 23062)
Comparative Biochemistry and Physiology 32, No. 4, 775-783 (February 15, 1970)

Soft-shelled clams were transferred from water of a salinity of 20 ‰ to waters in which the salinity ranged from 2 ‰ to 30 ‰. Total ninhydrin positive substances determined periodically in adductor muscle extracts indicated a 48-hr. acclimation period to a 5 ‰ medium. After 48 hr. in each of the media, the relation between salinity and the ninhydrin positive substances in the adductor muscle was linear. Ion-exchange chromatography of muscle extracts of clams kept in each medium for 5 days indicated that changes in glycine and alanine are largely responsible for this linear relationship.
[3 figures, 1 table, 23 references] LB

8.53

the M. norvegica but showed a closer relationship to phytoplankter fatty acids, suggesting that T. inermis is herbivorous.

The crustacean samples, obtained from the stomachs of fin whales, had 1.2 to 2.4% total lipid. The nonsaponifiable materials accounted for 3 to 5% of the lipids in M. norvegica and 10% in T. inermis. The authors suggested that the harvesting of crustacean zooplankters for food for hatchery salmonids may be economically attractive. [2 figures, 4 tables, 79 references]

8.51 CHEMICAL COMPOSITION OF PICKEREL AND BURBOT SLIME
(1.92)

Komarova, M. L. (U.S.S.R.)
Chemical Abstracts 72, No. 15, 76120w (April 13, 1970)

8.59 GLUCOSE LEVELS IN FRESH TILAPIA MUSCLE
(9.13)

Hoffman, A., J. G. Disney, B. E. Grimwood, and N. R. Jones (Tropical Products Institute, 56/62, Gray's Inn Road, London, W.C.1, England)
Journal of the Fisheries Research Board of Canada 27, No. 4, 801-803 (April 1970)

The glucose content of Tilapia muscle from fish that were pond-reared and aquarium-reared were estimated at the time of death of the fish (the fish were killed by immersion in liquid nitrogen). The glucose content of pond-reared Tilapia muscle ranged from 0.1 to 1.8 μmole/g. and of the aquarium-reared fish from 1.7 to 3.9 μmole/g. [2 tables, 9 references] FTP

8.42

whether any similarity exists between the selenium in marine organisms and the selenium-organic compounds in terrestrial organisms.

The arsenic and selenium content of the following marine animals was determined: cod, herring, mackerel, Norway haddock, lobster, mussel, clam, oyster, squid, and whale. Analyses were made of the raw materials and of the water-soluble fraction (N liquor) after the raw materials were boiled with distilled water. Samples of the skin, bone, and liver of the cod and herring were also analyzed.

The arsenic and selenium content of the fish samples was significantly lower than for the samples of the other marine animals tested. An enrichment of arsenic occurred in the N liquor (as compared with the raw material). Selenium is enriched in the N liquor from the fish samples but not from the invertebrate animal samples tested.

In addition to the foregoing tests, the author fractionated by molecular gel filtration the N liquor and the water-soluble phase of the enzyme-hydrolyzed press cake and determined the arsenic and selenium content of the fractions from these elutions. Selenium was present in these fractions in molecules with molecular weight above 5,000. Arsenic was associated with the lower molecular weight fractions, and may be present as more arseno-organic compounds.

These results are important relative to the use of fish as a feed ingredient for domestic animals, because probably all the arsenic and at least part of the selenium in fish are present as organic compounds. Organic compounds of arsenic, and to some degree those of selenium, are less toxic than the inorganic compounds of these elements. Also, arsenic may have the same beneficial effect on the growth and health of the organism as has been reported for organic compounds of arsenic, Raw fish material should also provide an adequate source of the trace element selenium. [5 figures, 3 tables, 21 references]

8.51 GAMMA-AMINOBUTYRIC ACID (GABA) IN FISH ERYTHROCYTES
(1.69)

Fugelli, K. (Institute of Zoophysiology, University of Oslo, Blindern, Oslo 3, Norway)
Experientia 26, No. 4, 361 (1970)

The author found that GABA and taurin are the major constituents of the intracellular extractable amino-acid pool in the erythrocytes of flounder (Pleuronectes flesus), plaice (P. platessa), and dab (P. limanda). Both GABA and taurin leave the flounder erythrocytes under similar experimental conditions. The same substances are in vivo reduced in concentration in the erythrocytes of all three fishes under conditions that lead to a decrease in plasma osmolality. Thus the author concludes that GABA and taurin serve as osmotically active solutes in the regulation of cell volume under conditions that lead to an alteration in plasma osmolality. [1 figure, 8 references] LB

8.51 BLOOD SERUM PROTEINS OF SALMONID FISHES

Novikov, G. G., and Yu. S. Reshetnikov (Institute of Evolutionary Morphology and Ecology of Animals, Academy of Sciences of the U.S.S.R., Moscow)
Problems of Ichthyology 9, No. 1, 119-126 (1969)

The blood plasma of whitefish (Coregonus lavaretus L.) was analyzed and the data were compared with those for salmon (Salmo salar), brown trout (S. trutta), Sevan trout (S. ischchan geegarkuni Kessl.), Arctic char (Salvelinus alpinus L.), and grayling (Thymallus thymallus L.). The plasma protein fractions of each species were found to have characteristic distribution and quantitative relationships. Groups of whitefish within the Coregonus species could not be distinguished by the composition of their blood; however, the relative proportion of the different plasma protein fractions tended to vary, giving each species its own characteristic distribution and content of protein fractions.
[3 figures, 6 tables, 29 references] LB

8.59 (9.13) TISSUE CAROTENOIDS IN PRESPAWNING AND SPAWNING SOCKEYE SALMON (ONCORHYNCHUS NERKA)

Crozier, George F. (Marine Science Institute, University of Alabama, Bayou La Batre, Ala. 36509)
Journal of the Fisheries Research Board of Canada 27, No. 5, 973-975 (May 1970)

A functional significanee for egg carotenoid was suggested by Hartmann et al. (1947) and Hubbs and Stavenhagen (1958), but the mechanism has not been explained. Tinbergen (1953) established the role of skin pigmentation in animals as a breeding stimulus. The color of sockeye salmon flesh is due to the presence of free astaxanthin. Transport of carotenoid to skin and eggs has been shown in various salmonids, but the system of sockeye salmon has not been defined nor have data on tissue concentrations of carotenoids been reported.

This note reports the carotenoid content of the muscle, skin, and gonads of prespawning sockeye salmon (caught near Juneau, Alaska, U.S.A.) and spawning sockeye salmon (taken from the Wauk Wash River, British Columbia, Canada).

The muscle of the prespawning fish, male and female, contained high concentrations of carotenoid; the skin of both contained much less carotenoid than did the muscle but the concentrations were about similar in the two sexes. In the spawning fish, the portions of the carotenoid retained by the two sexes were deposited in different areas--exclusively in the skin of the males and primarily in the eggs, with less in the skin, of the females. [1 table, 8 references]

8.59 (8.64) OCCURRENCE OF TRIGONELLINE (N-METHYL NICOTINIC ACID) IN THE ADDUCTOR MUSCLE OF A LAMELLIBRANCH, THE SEA SCALLOP (PLACOPECTEN MAGELLANICUS)

Hiltz, Doris Fraser (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 3, 604-606 (March 1970)

Beers (1967) reported the presence of trigonelline in certain marine crabs and in lobster but did not detect it in certain two species of molluscs. Homarine, one of the naturally occurring quaternary ammonium compounds, appears to be widely distributed among invertebrate species, but trigonelline (an isomer of homarine) has been found less frequently.

In the present study, trigonelline was found in the adductor muscle of the scallop in amounts ranging from 0.7 to 1.3 µmoles/g. This appears to be the first published record of the occurrence of trigonelline in the Lamellibranchiata. [1 figure, 1 table, 7 references]

8.59 (3.4) BENZO(A)PYRENE IN SMOKED MEAT PRODUCTS

Rhee, Ki Soon, and L. J. Bratzler (Department of Food Science, Michigan State University, East Lansing 48823)
Journal of Food Science 35, No. 2, 146-149 (March-April 1970)

Originally foods were smoked to preserve color and to flavor the products. Now that other methods of preservation are available, foods are smoked mainly to impart desirable flavor and color. Carcinogenic polycyclic hydrocarbons have been found in wood smoke, the amounts being related to the method of smoke generation, temperature of combustion and oxidation, air supply, length of the smoke ducts, and density and temperature of the smoking operation. The question arises as to whether any carcinogenic hydrocarbon can be found in the smoke generated under commercial production conditions in the United States. In the present study, therefore, smoked meat products were examined relative to their content of benzo-(a)pyrene (BaP) or 3,4-benzopyrene (the first carcinogen discovered in coal tar). For this study, the amount of BaP in the food product was used as an "arbitrary indicator" of the presence of carcinogenic polycyclic hydrocarbons because previous workers had observed the concentration of BaP in cigarette smoke correlated with "tar" tumorigenicity. Furthermore, most polycyclic hydrocarbons are pyrosynthesized in wood-smoke production at a favorable generation temperature. Bologna was used as the test food product because of its suitability for the study and its homogeneity for sampling.

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8.7 (3.3343) ÜBER KRABBENERZEUGNISSE UNTER BESONDERER BERÜCKSICHTIGUNG VON "KRABBEN IN GELEE" [SHRIMP PRODUCTS, WITH PARTICULAR REFERENCE TO "SHRIMPS IN ASPIC"]

Hensel, G., and J. Wurziger (Hygienisches Inst. Freie und Hansestadt Hamburg, West Germany)
Archiv für Lebbensmittelhygiene 20, No. 11, 252-257 (1969)
Food Science and Technology Abstracts 2, No. 5, 722, 5R173 (May 1970)

The authors determined that the composition of 11 samples of brown shrimp product was as follows:

Type shrimp product	No. of samples	Range of values for		
		Moisture	Fat	Cholesterol
		percent		mg./100 g.
Freshly peeled	3	72.7-74.3	1.2-4.0	137-210
Canned	5	71.8-78.7	1.0-1.4	94-167
Deep frozen	3	70.2-73.7	1.3-1.5	132-150

They also determined the weight of from 1 to 20 samples of shrimp in aspic obtained from each of 10 manufacturers. The actual shrimp content of the packs ranged from 16.01 to 29.8 percent; the declared content ranged from 16.7 to 42.9 percent. The shrimp content of samples of shrimp salads analyzed over the past

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8.59

The authors developed a procedure for analyzing BaP in smoked meat products involving extraction, solvent partition, column chromatography, and spectrophotometric measurement. Then, studies were carried out on the effect of artificial casings on the content of BaP in the meat product, penetration of BaP through a meat product in smoking, possible presence of the hydrocarbon in unsmoked meats, and distribution of the compound after cooking smoked meat. Bacon was used in the experiment on the effect of cooking.

Bologna smoked in casings had much less BaP than that smoked without casings. All the BaP was in the outer part of the bologna; the hydrocarbon did not penetrate farther, in most cases, than 1.4 to 1.6 mm. from the surface. Unsmoked beef and pork did not contain endogenous BaP. More than one-half of the BaP in smoked bacon appeared in the fat dripping after cooking the bacon.

[2 figures, 4 tables, 19 references]

8.8 (3.234)(1.85)

LA CALIDAD DEL CAMARON CONGELADO [THE QUALITY OF FROZEN SHRIMP]

Tornes, Eilif, and Paul George
Informe Tecnico No. 7, 13 pp. (1970) (In Spanish; English summary)

The methods for the examination of frozen shrimp, such as organoleptic tests, the counting of the number of shrimp with various defects, and chemical tests of the freshness of the shrimp, are considered.

A general description is then given of the improvements needed in handling and storing of the raw material and in the processing in order to improve the quality of the product, and special emphasis is placed on the necessity of a systematic production control vested with the required authority, as an integral part of the production.

The role of the Technology Laboratory in Maracaibo in assisting the industry to start these production control activities as well as in other technical aspects related to the handling and processing of fish, is described.

[2 sample grading forms]

Reprinted in part

8.59 (3.8)(1.24)

STUDIES ON THE FLAVORING 5'-MONONUCLEOTIDES OF PICKLE OF SMALL SARDINE

Lee, C. Y., K. H. Lee, I. J. Han, and S. S. Kim
J. Kor. Assoc. Food Sci. 1, No. 1, 66-73 (1969)
Korean Scientific Abstracts 2, No. 2, 64, Abstract 70/225 (April 1970)

More than thirty kinds of seafood pickles have been eaten in Korea. Out of these, the salted small sardine pickle was analyzed for its components and its enzyme characteristics were investigated. Also studied was the effect of enzymes on the production of flavorous 5'-mononucleotides.

The results are summarized as follows:

1. No accumulation of flavorous 5'-mononucleotides was demonstrated because RNA-depolymerase in the raw materials and the pickles tended to decompose RNA into nucleoside and phosphoric acid.

2. 5'-Inosinic acid and 5'-adenylic acid were found in large amounts in the salted small sardine pickle.

3. 5'-Inosinic acid was contained in the salted small sardine pickle in a significant concentration, and it might be considered to be an inosinic acid type.

[7 figures, 4 tables, 40 references]

8.7

5 years was 56.7, 49.4, 40.0, 43.1, and 36.0 percent (mean value) for the respective years.

Although some shrimp is lost during separation for analysis, the authors suggest that such losses should be no more than 15 percent and that this value should be used in checking declared contents for shrimp in aspic.

[5 references]

9.14 (1.95)

DIET-INDUCED THIAMINE DEFICIENCY IN CAPTIVE MARINE MAMMALS

Geraci, Joseph R. (Montreal Aquarium, Montreal, Quebec, Canada)
Chemical Abstracts 72, No. 13, 64124n (March 30, 1970)

9.16 (1.85)

SUMMARY OF A PRELIMINARY REPORT ON ARTIFICIAL PROPAGATION OF METAPENAEUS MONOCEROS (FABRICIUS)

Liao, I-chiu (Rockefeller Foundation Fish Culture Research Project), Yun-yuan Ting (Tainan Fish Culture Station), and Kunio Katsutani (Taiwan Fisheries Research Institute)
Report of Fish Culture Research Supported by Rockefeller Foundation, Chinese-American Joint Commission on Rural Reconstruction, Fisheries Series, No. 8, 72-76 (December 1969) (In Chinese; figures and summary in English)

Metapenaeus monoceros is a commercially important prawn that is grown with milkfish in ponds. The authors report the results of an attempt to propagate this prawn artificially. From nine ripe prawns taken from a shrimp trawler and kept in 500-liter, constantly aerated tanks, the authors obtained 4,960 young prawns. A description of hatching conditions and of the physical characteristics of the young prawns during various stages of development is given. The authors found that Metapenaeus monoceros is hardier than Penaeus monodon and that the naupli at a density of 25 per liter of water would develop satisfactorily without fresh sea water's being added to the tank. [4 figures, 8 references] LB

8.51 (6.54)

COMPOSITION OF NUOC-MAM FROM THE IVORY COAST

Riviere, R., and G. Dubroca (Ivory Coast)
Chemical Abstracts 72, No. 19, 99315c (May 11, 1970)

9.1 (1.86)

PROJECTION OF THE LATERAL EYE OF LIMULUS TO THE BRAIN

Snodderly, D. Max, Jr. (Department of Psychology, University of California, Berkeley 94720), and Robert B. Barlow, Jr. (Laboratory of Sensory Communication, Syracuse University, Syracuse, New York 13210)
Nature 227, No. 5255, 284-286 (July 18, 1970)

In analyzing the visual mechanisms from the eye into the central nervous system of the horseshoe crab Limulus, the authors mapped the lateral eye to show the detailed structure of the bands of ommatidia that project to natural bundles in the optic nerve, the ordering of the bands, and the projection of the bands into the various regions of the first optic ganglion of the brain.

[2 figures, 17 references] LB

9.12 (8.0) BODY COMPOSITION CHANGES DURING GROWTH IN YOUNG SOCKEYE (ONCORHYNCHUS NERKA) IN FRESH WATER

Groves, T. D. D. (Department of Bacteriology and Biochemistry, University of Victoria, Victoria, British Columbia)
Journal of the Fisheries Research Board of Canada 27, No. 5, 929-942 (May 1970)

Although data on body composition in different species of salmonids have been reported, the changing relations between the various major chemical components of the body during growth of the fish are not understood. Also, generally applicable expressions, for predictive purposes, involving total protein, fat, water, and ash have not been developed. Therefore, the authors examined data on the proximate composition of sockeye salmon and other species of salmon to further document changes in body composition with growth, and to develop equations for estimating total body composition in salmon based upon easily measured parameters such as fork length, live weight, and total body water. He derived the following equations for the estimation of total water (W), protein (P), and fat-free dry material (FFDM, consisting of protein and ash) in grams, based on the measurement of either water content (weight in grams of total body water) or fork length (in centimeters):

$W = 0.00571\ L^{3.118}$
$P = 0.204\ W^{1.038}$
$FFDM = 1.113\ P.$

Fat is estimated as the difference between the wet body weight and the lean mass (W + FFDM). [1 figure, 7 tables, 31 references]

9.13 EFFECTS OF COENZYME A AND CARNITINE ON FATTY ACID OXIDATION BY RAINBOW TROUT MITOCHONDRIA

Bilinski, E., and R. E. E. Jonas (Fisheries Research Board of Canada Vancouver Laboratory, Vancouver 8, British Columbia)
Journal of the Fisheries Research Board of Canada 27, No. 5, 857-864 (May 1970)

Previous work has shown that the red lateral line muscle of the fish has a greater ability to oxidize fatty acids than does the white muscle. The authors described the general properties of the fatty acid oxidizing system in the mitochondria from the lateral line muscle of fish in an earlier article (1964). In the present study, they report on a study of the comparative aspects of the effect of Coenzyme A (CoA) and carnitine on the oxidative activity of mitochondria from various tissues of fish. They examined the effects of CoA and carnitine on the oxidation of 0.1 mM K-palmitate-1-^{14}C and K-oleate-1-^{14}C by mitochondrial fractions from lateral line muscle, white muscle, heart, liver, and kidney in rainbow trout (Salmo gairdneri).

The addition of CoA (0.01 and 0.10 mM) to the incubation medium stimulated the oxidation of the fatty acids by mitochondria from lateral line muscle and heart. With preparations of mictochondria from all the materials used, fatty acid oxidation was increased by the addition of carnitine (1.0 mM) and, in the presence of carnitine (1.0 mM), CoA (0.1 and 1.0 mM) gave a further increase in oxidative activity.

The mitochondria from the red lateral muscle and from the heart showed the same range of maximal activity that was considerably above the range obtained

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9.16 (1.81) SOME EFFECTS OF EXPERIMENTAL PROCEDURE ON SETTLEMENT OF OSTREA LUTARIA HUTTON

Cranfield, H. J. (University College of North Wales, Marine Science Laboratories, Menai Bridge, Anglesey, UK)
New Zealand Journal of Marine and Freshwater Research 4, No. 1, 63-69 (March 1970)

In 1968, the author found that the settlement pattern of Ostrea edulis, O. lurida, Crassostrea virginica, and C. gigas on a series of horizontal plates could be reversed by altering the environment. He suggested that the variation in the settlement patterns of these four species of oyster might be caused by larval responses to different conditions close to the various settlement surfaces used--since the type, texture, and arrangement of the plates usually differed, the immediate environment of the settlement surface was probably always different. In the study reported here, he tested the effect of his experimental method on the settlement pattern of yet another species, Ostrea lutaria.

The results showed that the intensity of settlement differed with the type and the angle of the settlement surface. The method of arranging the plates (in series or singly) was critical in determining the variation of spatfall with surface angle. The type of plate had no effect in this instance. Some factor, such as turbulence differences within the plate units, might possibly have affected the free-swimming larvae that were about to settle and, thus, could account for the different settlement patterns. Whether they were caused by a reversal of responses or by some passive concentration mechanism, however, the author could not

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9.16 (0.4) FISH PONDS AND THEIR HEALTH HAZARDS

Anonymous
Nutrition Reviews 28, No. 6, 155-158 (June 1970)

This is a review article. In certain areas where the diets of the population may contain inadequate quantities of protein and where the quality of such protein is poor, fish ponds may offer a way of producing a high yield of protein per acre. But, if fish ponds are improperly maintained or inadequately controlled, they may produce only low yields of fish and may lead to increased transmission of malaria and other mosquito-borne diseases (because they afford a favorable site for breeding). Also, ponds may lead to breeding of the snails that may be the intermediate host of schistosomiasis.

But if fish ponds are well constructed and maintained and if good management is practiced, then yields can be high and mosquito breeding will be minimal. Mosquito breeding can be controlled by use of larvicides. Use of a high spreading oil with 0.5% gamma-benzene hexachloride is recommended. The method is simple to carry out and is inexpensive. This method of control for a pond 200 square yards in area would cost one U.S. dollar a year for 52 dosings. Proctecting the ponds from contamination from human excreta would ensure that schistosomiasis would not become a problem even if snail hosts are present.

The conclusion is that it is possible to increase available protein supplies through the use of fish ponds without endangering the health of people provided that simple, adequate precautions are taken. [7 references]

9.16 RESEARCH REPORTS. TROUT FEEDS
(4.82)(8.8)

Anonymous
Feedstuffs 42, No. 26, 35 (June 27, 1970)

Leo E. Orme, Chief of the Diet Testing Development Center, Spearfish Fishery Center, Spearfish, South Dakota, has reported the results of taste tests on rainbow trout fed one of four feeds for the last 120 days before being harvested. The feeds contained either fish or soy oil or were fortified with either chelated minerals or chelated iron. After being harvested, the fish were packed, frozen, and shipped to another location. Then they were thawed, cooked, and evaluated for taste by a trained panel. Most of the 12 judges scored all four lots acceptable. The mean flavor scores were within a narrow range, the differences being insignificant except for those between trout fed fish oil and trout fed chelated minerals; this difference was significant at the 1% level. Since the trained panel could find no significant difference between the various lots of trout (with the exception noted), the researchers feel confident that the average consumer will find no significant difference in the palatability of trout raised on any of the four feeds.
LB

9.16 SURVIVAL OF YOUNG OYSTERS IN AREAS OF DIFFERENT SALINITY
(9.15)(1.81) IN MOBILE BAY
(1.0117)

May, Edwin B., and Donald G. Bland
Issued by the Alabama Marine Resources Laboratory, Alabama Department of Conservation, Dauphin Island, Alabama (October 1969), 3 pp. Free.

This paper reports on the survival of spat and young oysters from a September-October 1969 set in lower Mobile Bay. Two figures are given: the first shows the general salinity patterns in lower Mobile Bay and the second shows a comparison of the survival of young oysters in two areas of different salinity in the Bay. [2 figures, 6 references] FTP

9.12 ELECTROPHORETIC VARIANTS OF L-ALPHA-GLYCEROPHOSPHATE DEHYDROGENASE
(0.38) IN PACIFIC OCEAN PERCH (SEBASTODES ALUTUS)

Johnson, A. G., F. M. Utter, and H. O. Hodgins (Bureau of Commercial Fisheries Biological Laboratory, Seattle, Washington 98102)
Journal of the Fisheries Research Board of Canada 27, No. 5, 943-945 (May 1970)

This paper reports on the detection of three phenotypes of L-alpha-glycerophosphate dehydrogenase in the muscle extracts of Pacific ocean perch by starch-gel electrophoresis. No association between alpha-glycerophosphate dehydrogenase phenotype and sex or stage of maturity of the fish was noted. The authors suggest that a genetic system coding for α-glycerophosphate dehydrogenase in Pacific ocean perch may be useful for population studies.
[2 figures, 2 tables, 14 references] FTP

9.13 PLASMA PROTEIN VARIATION IN A WINTER FLOUNDER
(9.12)(0.35) (PSEUDOPLEURONECTES AMERICANUS) POPULATION

Pesch, Gerald (Graduate School of Oceanography, University of Rhode Island, Kingston, R.I.)
Journal of the Fisheries Research Board of Canada 27, No. 5, 951-954 (May 1970)

Variations in plasma proteins are intimately related to changes in the body's metabolic requirements, defense against invasion and injury, maintenance of pH and osmotic pressure, and regulation of cellular activity and function. Electrophoretic profiles of plasma proteins, therefore, are believed to be reliable indicators of physiological well being. This article describes the plasma protein variations in a sample of winter flounder taken in Narragansett Bay, Rhode Island, and includes information on the physiological states of the fish associated with these protein profiles. Pattern differences associated with gonad maturation, sex, disease, and age were found. [1 figure, 2 tables, 9 references] FTP

9.16 AN ATTEMPT TO IMPROVE TIDE LANDS FOR MARINE BIVALVES.
(1.8) II. THE PHYSICAL AND CHEMICAL COMPOSITION OF TAPES PHILIPPINARUM BEDS IN KYUNGGI BAY

Lee, Chaon Koo, and Nam Kee Chang
Bull. Kor. Fish. Soc. 2, No. 2, 155-160 (1969)
Korean Scientific Abstracts 2, No. 2, 57-58, Abstract 70/201 (April 1970)

The soil textures and chemical compositions of Tapes philippinarum beds were investigated in order to estimate the grade of the habitat soil of T. philippinarum for the improvement of natural tidal flats.

The coefficients of correlation between the percentages of debris, coarse sand, fine sand, silt, and clay of the habitat soil, and the population density of T. philippinarum were 0.78, 0.73, -0.42, -0.68, and -0.51, respectively. And the optimum levels of same were above 13.5%, above 23.0%, below 41.5%, below 10.0%, and below 6.8%, respectively. The SiO_2:Al_2O_3:Fe_2O_3 ratio of the soil of T. philippinarum beds showed the range of 5.09 to 5.60. The levels of soil pH, water holding capacity, organic matter, total nitrogen, available phosphorus, exchangeable magnesium were 6.15-6.60, 4.26-6.86%, 0.40-1.10%, 14.0-27.0 p.p.m., 0.041-0.394%, and 0.009-0.132%, respectively.
[12 figures, 19 tables, 51 references] Reprinted

9.16 (1.81)(1.0117) FEASIBILITY OF OFF BOTTOM OYSTER CULTURE IN ALABAMA

May, Edwin B.
Alabama Marine Resources Bulletin No. 3, 14 pp. (December 1969) (Alabama Department of Conservation, Seafoods Division, Alabama Marine Resources Laboratory, Dauphin Island 36528) Free.

Estuarine areas in Alabama were evaluated to determine their suitability for growing the American oyster, Crassostrea virginica, on strings suspended vertically off bottom. Few areas with sufficient depth afforded enough protection from wind and waves to be used for suspension culture.

Rafts constructed of lumber and Styrofoam and racks of creosoted posts and lumber were used to suspend oysters off bottom. Oysters falling off the strings was a serious problem.

Growth of suspended oysters was rapid. Oysters suspended from a raft in a pond grew from an average height of 18.3 mm to 87.7 mm in 8½ months. Ninety-one percent of these oysters were a legal harvestable size of 3 inches (76.2 mm) or over. Oysters grew faster in the pond than those suspended in natural waters. Pond oysters grew from 18.3 mm to 101.3 mm in 12 months and counted 200 per gallon.

Raising oysters by this method was not economically feasible because of high production costs and low market value. Cost of raising a barrel of oysters valued at about $9 would be between $16 and $20, not including harvesting and marketing. Cost of stringing cultch was almost equal to the value of the oysters raised. [12 figures, 15 references]

Author's abstract

9.16 CULTURE OF CATFISH IN CAGES PROVIDES DIVERSIFICATION

Anonymous
Feedstuffs 42, No. 29, 74 (July 18, 1970)

An Arkansas beef farmer, with the help of the Department of Agriculture's Soil Conservation Service (SCS), has installed two catfish cages in a 20-acre lake built to retard flooding. The advantages of cage culture are the ease of harvesting, of observing feed consumption, and of treating oxygen shortages, diseases, and parasites. Food conversion in caged fish is good. The disadvantages include poaching, unavailability of natural food to the fish, and the tendency of the close quarters to cause intensification in oxygen depletion, parasites, and diseases.

The SCS recommends that the cages be placed in open water, with 1 ft. of open water beneath them; the deeper the water, the better the fish should do. They may be anchored in open water or placed along the sides of a walkway; they should be spaced from 5 to 10 ft. apart. The presence of fish in the water outside the cages is desirable; where possible, bass should be the dominant species.

Information about cage construction, stocking rates, and feeding and management regimes is available from the SCS.

LB

9.16 (1.83) ABALONE FARM EXPECTED TO ASSIST RATHER THAN COMPETE WITH DIVERS

Bjornson, Jerome A.
National Fisherman 51, No. 4, 17-B (August 1970)

Although another California group has produced some abalones for the Oregon Department of Fish and Game, the only U.S. group presently engaged in rearing large numbers of abalone to harvestable size within the confines of large reservoirs is California Marine Associates (Cal-Marine), of Cayucos. Because the flow of sea water through the reservoirs is over 1,000 gal. a min., astronomically large numbers of the larvae are returned to the sea. Thus the firm, while producing about 1,000,000 abalones a year, will incidentally seed the adjacent offshore areas. It also expects to provide government agencies and other concerns with ½-in. juveniles to augment the natural population or to introduce the shellfish where needed. Intentional offshore bottom seeding by Cal-Marine should do much to revive the declining abalone industry in the Morro Bay, Palos Verdes, and San Diego areas.

The firm's major objective is to develop a commercial food product in the form of canned 3- and 4-year-old abalones and of steaks from the 5-year-olds. The marketing specialist in the three-man owner group is looking especially for unusual epicurean items--those that are variously treated and canned. The biologist of the group is looking for some means of harvesting kelp on a massive scale so they can supply the several tons of kelp that one million 4-year-old abalones require daily. [4 photographs]

LB

9.19 RESIDUES OF DIELDRIN, LINDANE, DDT, AND PARATHION IN A LIGHT SANDY SOIL AFTER REPEATED APPLICATION THROUGHOUT A PERIOD OF 15 YEARS

Voerman, Simon, and A. F. H. Besemer (Laboratory for Research on Insecticides, and Plant Protection Service, Wageningen, The Netherlands)
Journal of Agricultural and Food Chemistry 18, No. 4, 717-719 (July-August 1970)

As part of an experiment to determine the influence of pesticides on the yield of crops, the authors examined the persistence of pesticides in the cultivated soil. From 1953 on through a period of 15 years, dieldrin, lindane, DDT, and parathion, at two concentration levels, were sprayed on crops several times a year. In addition, the soil was treated with the insecticides once a year. Soil samples were taken regularly throughout the whole period and checked for quantities of the pesticides. This paper reports the results of residue analyses of the soil samples taken after 15 years in layers of 10 cm. (3.9 inches) thickness to a depth of 60 cm. The soil was light sandy.

DDT and dieldrin were more persistent than lindane. Parathion disappeared relatively soon. Below 20 cm. in depth of soil, traces of only dieldrin and DDT were found. [4 tables, 5 references]

FTP

9.16 (9.17) LABORATORY TESTS OF AN ELECTRICAL BARRIER FOR CONTROLLING PREDATION BY NORTHERN SQUAWFISH

Maxfield, Galen H., Robert H. Lander, and Charles D. Volz (Bureau of Commercial Fisheries Biological Laboratory, Seattle, Washington 98102)
Special Scientific Report--Fisheries No. 611, 8 pp. (July 1970)

Northern squawfish (Ptychocheilus oregonensis) prey extensively on the young of sport and commercial fishes. Of particular concern to us was their heavy predation during early spring and summer on salmon (Oncorhynchus spp.) that are released from upstream hatcheries on the Columbia River and must pass through squawfish-infested areas on their way to the sea. Control of these predators entailed finding a means of blocking their passage into the release areas of the hatchery-reared salmon without interfering with the outmigration. For this purpose, we explored in the laboratory the effectiveness of electrical fields previously found to direct the movements of salmon fingerlings.

On the basis of test results, four electrode arrays, with capacitor discharge pulses at 8 pulses per second and a pulse duration equivalent to that of 40 millisecond "rectangular pulse," were tested at three voltage gradients. A staggered array of electrodes in which the electrodes were spaced at 61-cm. intervals in rows 200 cm. apart was most effective. At the voltage gradients of 0.75, 1.00, and 1.25 volts per centimeter, 85, 93, and 96 percent respectively, of the squawfish were blocked.
[4 figures, 5 tables, 8 references] Authors' abstract in part

9.19 (1.3) RADIONUCLIDE DISTRIBUTION IN PACIFIC SALMON

Jenkins, C. E. (Battelle Memorial Institute, Pacific Northwest Laboratory, Richland, Washington 99352)
Health Physics 17, No. 3, 507-512 (1969)
Food Science and Technology Abstracts 2, No. 1, 127-128, Item 01R29 (January 1970)

The following gamma-emitting radionuclides were detected and measured in four species of Pacific salmon: ^{54}Mn, ^{60}Co, ^{137}Cs, ^{226}Ra, ^{22}Na, ^{40}K, ^{46}Sc, ^{51}Cr, ^{57}Co, ^{59}Fe, ^{65}Zn, ^{88}Y, ^{110m}Ag, ^{140}Ba, ^{152}Eu, ^{203}Hg, and ^{208}Tl. The concentration of the first two decreased in muscle tissue of salmon caught from Northwest Alaska through Southern Alaska to the Washington-Oregon coast by factors of about 1.5 to 3 and 4.5 to 12, respectively. The concentration of ^{137}Cs decreased only about 25 percent. Concentrations of ^{226}Ra in the tissues of Alaskan salmon were high enough to cause natives who ate the fish to exceed their maximum permissible level. Among the factors affecting the distribution pattern of the radionuclides were the amount present in the Columbia River and the nuclear tests conducted by the Chinese. [23 references] [Extracter: L. Baldwin]

9.10 (9.19) LABORATORY MEASURE OF AN ECOSYSTEM RESPONSE TO A SUSTAINED STRESS

Coler, Robert A., and Haim B. Gunner (Department of Environmental Sciences, University of Massachusetts, Amherst 01002)
Applied Microbiology 19, No. 6, 1009-1012 (June 1970)

The authors describe a new method for measuring environmental stress that involves charting changes in rhizosphere composition of duckweed (Lemna minor) under specified laboratory conditions. [2 figures, 1 table, 4 references] FTP

9.3 OPTIMUM RELATIONSHIP BETWEEN ARTIFICIAL AND NATURAL REPRODUCTION FOR COMMERCIAL POPULATIONS OF FISHES

Shapiro, A. P. (Computer Center, Kuybyshev Far Eastern Polytechnic Institute), and V. L. Andreyev (Far Eastern University, Vladivostok, U.S.S.R.)
Problems of Ichthyology 9, No. 1, 45-49 (1969)

The best arrangements for control of a fish population by regulation of the intensity of commercial fishing and of artificial reproduction are examined. For fishes that have short life cycles and do not spawn repeatedly, the solution can be arrived at analytically by use of Ricker's equation: $E_i + 1 = \alpha E_i e^{-\beta E}$, where E_i is the population density in the year i, and α and β are coefficients. For fishes that have a spawning population characterized by different age groups that do not spawn repeatedly, the solution can be arrived at mathematically by use of a computer. The authors found such an answer by selecting the best variant in accordance with the isopleth diagram of catches.

The need for strict coordination of the activities of commercial fishery agencies and fish-farming organizations is emphasized. Conditions under which artificial breeding serves no useful purpose are noted.
[3 figures, 11 references] LB

9.17 (9.3)(1.953) WHALERS GO SLOWER WITH HARA-KIRI

Anonymous
Nature 227, No. 5253, 2-3 (July 4, 1970)

At its annual meeting in London the latter part of June, the International Whaling Commission decided to leave the allowable Antarctic catch limit at 2,700 blue whale units (1 blue whale unit = 2 fin whales = 6 sei whales); they extended the worldwide ban on blue whales for another 5 years. Of additional significance at the meeting was the agreement by all 12 member countries of the commission to fix limits, for the first time, on the separate species: 1,308 fin whales, 4,710 sei whales, and 13,551 sperm whales (which are not presently considered in danger of being over exploited). Any effective means of improving the control of whaling and of setting realistic catch limits still awaits some accurate means of estimating stock size, particularly the rate of recruitment. LB

9.17 (9.19)(9.6) WATER IN THE CHEMICAL AND ALLIED INDUSTRIES: ITS USE, TREATMENT, CONSERVATION AND DISPOSAL

Henson, J. L.
Society of Chemical Industry, 14 Belgrave Square, London, S.W.1, England (n.d.), 184 pp., 60s
Reviewed by W. T. Roberts
New Scientist 47, No. 709, 95 (July 9, 1970)

This book discusses all aspects of water--its use, sources, treatment, recirculation, and reuse; it also covers effluent disposal and legislation applicable to the subject. LB

9.6 A SELECTED BIBLIOGRAPHY OF ALABAMA ESTUARIES

Crance, Johnie H.
Alabama Marine Resources Bulletin No. 2, 21 pp. (July 1969) (Alabama Department of Conservation, Seafoods Division, Alabama Resources Laboratory, Dauphin Island 36528) Free.
This bibliography lists references to published and unpublished information germane to Alabama estuaries. FTP

9.19 ACCUMULATION OF DDT RESIDUES IN TRIPHOTURUS MEXICANUS FROM THE GULF OF CALIFORNIA

Cox, James L. (Hopkins Marine Station, Stanford University, Pacific Grove, California)
Nature 227, No. 5254, 192-193 (July 11, 1970)

Robinson et al. (1967) have theorized that the presence of DDT residues in fish cannot be accounted for in the same way that it can in mammals and birds, since fish probably do not produce water-soluble metabolites. The metabolic precursors of the water-soluble metabolites p,p'-DDA and DBP are found in measurable quantities in known metabolizers; they have not been found in fish. Moreover, fish take up DDT residues through the skin or the gills as well as along with the food and pass them out into the water again. Just how important this diffusive process across the gills is in the concentration of residues in the tissues of fish is not clearly understood. Earlier workers have assumed that the concentration is governed by an equilibrium between inward and outward diffusion. More recent workers, however, have found that fish progressively accumulate ^{14}C-DDT from water without any equilibrium point's being reached. If the diffusive loss of residues to water is insignificant relative to the residues assimilated from the stomach contents, then older, larger fish should have higher concentrations of the pesticide than younger, smaller fish would. If, on the other hand, there is a diffusion equilibrium between residues in the body and those in the water, the size of the fish would not affect the concentration in the body, given a fixed, homogeneous concentration in the ambient water.

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9.19 SOME ECOLOGICAL EFFECTS OF DISCHARGED WASTES ON MARINE LIFE

Grigg, Richard W. (University of California at San Diego), and Robert S. Kiwala (Scripps Institution of Oceanography, San Diego, California)
California Fish and Game 56, No. 3, 145-155 (July 1970)

The largest sewerage system in southern California in terms of discharge is the Los Angeles sewer outfall at White Point, Palos Verdes Peninsula (near San Pedro, California) where approximately 360 million gallons are discharged daily. The depth of the outfall terminus and diffusers ranges between 165 and 195 ft. Treatment is primary.

In 1954, the Institute of Marine Resources (I.M.R.) of the University of California contracted to study the effects of oceanic disposal on the nearshore environment at White Point. This study included a survey of the effect of effluent on the biology of the area. The present paper describes the results of a recent survey (June, 1969) that partially duplicated this program. The purpose was to collect comparable data, and to examine these in order to detect possible long term ecological changes.

Data collected during the 1969 survey show that the number of species enumerated at each station is negatively correlated with the amount of fine grain organic laden sediment present in the cores (Kendall Tau Correlation Coefficient, -0.80, p. = 0.10). Fish appear to be particularly affected.... The reduction of benthic species is probably due to decreased settlement and survival of their larvae caused by fine grained sediments which cover the bottom. Since these benthic

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Reprinted in part

9.19 POLLUTION CONTROL REPORT--PART 1

La Motte, Clyde, et al.
Ocean Industry 5, No. 6, 39-61 (June 1970)

"The U.S. Plan to Control Water Pollution," by Clyde La Motte; pp. 39-45. (A survey of the causes and types of water pollution, the costs of control, pending legislation, and proposed state and national policies) [13 illustrations] 2 tables]

"Notes on Industry's Oil Spill Control Activities," by M. A. Wright; pp. 46-48. [2 illustrations]

"Control of Oil Spills--Recent Technical Developments," by Maretta Tubb; pp. 48-61.
(1. "Keeping oil off the water"--removing oil from stricken tankers; around-the-clock surveillance of oil wells; killing wild wells at sea; underwater tents to catch oil seepage. 2. "Containing and removing oil from water"--flexible boom that conforms to water surface; two new boom concepts: boom with inflatable tube collar and skimming device, and boom with attached inflatable bulwark; boom supported by spar buoys; barrier that can be deployed by air; a flexible, deep-curtained boom; containment and removal system designed for rough water; sea fence; porous tubing for air barriers, reverse osmosis; "sea-skim" boom system that uses the current to "sweep" spills; use of a vortex to remove oil from the sea; pickup system that uses urethane-foam chips to soak up oil; rugged skimmer for open seas; "mop cat" to pick up oil; skimming barge that surrounds slick with retrievable boom; containment and skimming system; containment fence that comes in 10-ft. sections; Buda 1--antipollution barge; boom for harbors and rivers; "seabeads" that

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LB

9.3 CONTROL OF OCEAN RESOURCES: SOME ALTERNATIVE METHODS

Napoli, James (University of Rhode Island Resource Information Office)
Fish Boat 15, No. 7, 19, 40-41 (July 1970)

Establishment of an intermediate zone beyond the 200-meter isobath has been proposed by several authorities in an effort to equalize the availability of resources on the continental shelf. The U.S. Commission on Marine Science, Engineering, and Resources proposed that an intermediate zone be located between the 200-m. and the 2,500-m. isobaths and that these depths be equated with 50 and 100 nautical miles from shore, respectively. Within this intermediate zone, only the coastal state or its licensees would be permitted to exploit and explore. However, they would operate under international authority, and part of the revenue obtained would go into an international fund.

Dr. Lewis M. Alexander, executive director of the Law of the Sea Institute at the University of Rhode Island, has offered alternative methods for fixing the outer boundary of the continental shelf. In a paper ("Alternative Regimes for the Continental Shelf") presented at a conference held in preparation for the Pacem in Maribus conference at Malta, Dr. Alexander pointed out that no proposal for control of ocean resources will provide both the international distribution of marine wealth and the protection of the interests of the coastal states unless it embodies the concept of an intermediate zone. However, he suggested four changes in the U.S. Commission's proposal for such a zone. (1) The 50-mile equivalence with the 200-m. isobath should be dropped, for such a boundary to the

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9.6 (1.9)

ANNOTATED REFERENCES ON THE PACIFIC SAURY, COLOLABIS SAIRA

Hughes, Steven E. (Bureau of Commercial Fisheries, Exploratory Fishing and Gear Research Base, Seattle, Washington 98102)
Special Scientific Report--Fisheries No. 606, 12 pp. (June 1970)

The pertinent literature on the saury is reviewed, because of the recent interest in developing a fishery for this species along the west coast of the United States. Over three-fourths of the 72 references concern Japanese or Soviet reports on their saury stocks and fishing industries.

The annotations briefly describe the nature of the research and summarize the important results or conclusions.

A subject-author index is provided. Author's abstract

9.19 (1.0118)

PESTICIDE CONCENTRATIONS IN GREAT LAKES FISH

Reinert, Robert E. (Fish and Wildlife Service, Bureau of Commercial Fisheries, Ann Arbor, Michigan)
Chemical Abstracts 73, No. 1, 2963x (July 6, 1970)

To obtain information about the relation between fish size and the concentration of pesticide residues, the author analyzed 20 samples of Triphoturus mexicanus that had been caught by midwater trawl in an area in the Gulf of California relatively remote from zones of pesticide application. The fish were weighed and sorted into groups of narrow size range. Then the lipid fraction containing the pesticide was extracted with very pure n-hexane. Residues were identified by multiple-column gas-liquid chromatography. The findings are tabulated below.

Number of Samples	Fish	Weight range (mg.)	Total concentration (parts/10⁹ ±s.e.)	Concentration of DDT	Concentration of DDE	Concentration of DDD (percent)
1	1	996	14	36	36	28
1	2	2,483	26	62	27	11
4	22	29 - 711	31 (±10)	73	20	7
9	23	29 - 1,196	37 (±10)	52	35	13
1	5	378	46	76	15	9
1	2	635	58	85	10	5
4	64	21 - 867	45 (±24)	64	23	13

These data show that total residue and DDE concentrations increased as the weight of the fish increased. Thus the cumulative-assimilation hypothesis appears to be valid for T. mexicanus. [1 figure, 1 table, 15 references]

9.19

9.19

EFFECTS OF POLLUTION ON THE STRUCTURE AND PHYSIOLOGY OF ECOSYSTEMS

Woodwell, G. M. (Biology Department, Brookhaven National Laboratory, Upton, New York 11973)
Science 168, No. 3930, 429-433 (April 24, 1970)

The accumulation of toxic substances in the biosphere causes complex though predictable changes in the structure and the function of natural ecosystems. The structural changes in both plant and animal communities include simplification of structure, shifts in the ratio of gross production to total respiration, and losses in the nutrient inventory. Only a few studies (those concerned with the effects of ionizing radiation, persistent pesticides, and eutrophication) have clearly shown the pattern of these changes. Using the effects of radiation as a model, the author demonstrates the pattern of changes actuated by chronic radiation and shows the parallel between these effects and those of fire, oxides of sulfur, herbicides, and pesticides. He also shows that the ecological effects of pollution can be anticipated in detail.
[1 figure, 23 references] LB

9.19

burn off tanker oil spills; controlled burning of heavy fuel oil spill at sea.)
[45 illustrations]

The third section of Miss Tubb's review, "Chemical treatment," will be in Part 2 of this report, which is to be continued in the July issue of the magazine.

9.3

continental shelf would place the limit of national jurisdiction beyond the continental slope for more than half the world's coasts and, if applied to islands throughout the world, would restrict large segments of the ocean. (2) The 100-mile equivalence with the 2,500-m. isobath should be dropped; the limit should, instead, be set at the point where continental rock meets oceanic rock. (3) Exploitation and exploration of the sea floor should be controlled by the coastal state rather than by international authority; the revenue so gained would go to the international fund on a graduated scale--a small percentage from resources exploited close to the 200-m isobath and increasing percentages from resources exploited at decreasing distances from the foot of the continental slope. (4) The terminology of the intermediate zone should be consistent with geographic realities so that the regime for the slope can be distinguished from that of the shelf.

Under this proposal, the development of the seabed must yield revenue within a relatively few years. Moreover, the regime is amenable to change should future discoveries or needs dictate. The proposal itself contains provisions that should make it appealing to states with a wide variety of interests in the seabed. In addition, it can be adopted in stages, beginning with some interim provision for exploitation beyond the 200-m. isobath; more difficult problems can be resolved in the later stages.

Also discussed in the paper were four alternative systems for delimiting the continental shelf, which problem, Dr. Alexander believes, cannot be separated from that associated with a regime for the deep-sea bed.

9.19

species make up the diet of many resident fishes, numbers of resident fishes in turn would be expected to decline. In an 8-year study of southern California kelp bed resources, it was found that the diversity (number of species) of fish was not altered significantly by the presence or absence of giant kelp but rather was positively correlated with the degree of bottom relief (North and Hubbs, 1968). Since the bottom topography at White Point has not changed, the decline of fishes there, if not caused directly by toxic waste products, may indicate that relief is more important as a substrate for food rather than a source of shelter or a point of orientation. [3 figures, 4 tables, 9 references]

9.125 (1.11) COMPARATIVE ELECTROPHEROGRAMS OF TWO SPECIES OF FRIGATE MACKEREL

Taniguchi, Nobuhiko (Department of Cultural Fisheries, Faculty of Agriculture, Kochi University, Nangoku, Kochi Pref. 783, Japan), and Izumi Nakamura (Department of Fisheries, Faculty of Agriculture, Kyoto University, Maizuru, Kyoto Pref. 625, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 2, 173-176 (February 1970)

Specific differences in two frigate mackerels, Auxis thazard and A. rochei, caught in Japanese waters were examined by the cellulose acetate electrophoretic method. The electrophoretic patterns of both species had five components, but the electropherograms of the muscle proteins of A. thazard showed no component D and those of A. rochei showed no B. The two species were clearly distinguishable by the percentage and the mobility of the components. This finding refutes that of Fraser-Brunner (1950) and of Rivas (1951) and confirms the conclusion of Fitch and Roedel (1963) that Auxis consists of two species.
[2 figures, 1 table, 7 references]

9.6 METHODS FOR THE ASSESSMENT OF FISH PRODUCTION IN FRESH WATER

Ricker, W. E. (ed.) (Fisheries Research Board of Canada)
Hugh R. MacCrimmon (rev.) (Department of Zoology, University of Guelph, Guelph, Ontario, Canada)
International Biological Program Handbook No. 3, 326 pp. Blackwell Scientific Publications, Oxford and Edinburgh (1968) $6.50.
Transactions of the American Fisheries Society 99, No. 1, 251-252 (January 1970)

This book has 13 chapters. Among the subjects covered are estimation of population number and mortality rates (by D. S. Robson and H. A. Regier); production (by D. W. Chapman), dealing with the uses of vital statistics data as statistical components of fish production computations; causes of fish mortality (by John E. Poling), bringing out the ecological significance of production, diseases, pollution, and environmental change; the appraisal of a fishery (by J. A. Gulland), discussing regulations and management; and the experimental approach (by Tadeusz Backiel), stressing the potential of ponds, aquaria, and natural waters for planned and controlled experiments on the effect of environment on fish and fish populations.

The usefulness of a book of this nature for the conduct of international investigations in accordance with a concerted plan is stressed by the reviewer.
[54 illustrations, 1,054 references]

9.19 (1.013) [FLUORINE CONTENT OF FOOD AND BEVERAGES CONSUMED IN CHILE]

Schmidt-Hebbel, H., R. Truhaut, C. Boudeue, I. Pennacchiotti, A. Jimenez J., E. Torres (Facultad de Quimica y Farmacia, Univ., Alameda Bernado O'Higgins 1058, Santiago, Chile)
Anales de Bromatologia 21, No. 1, 29-36 (1969)
Food Science and Technology Abstracts 2, No. 4, 488, 4G194 (April 1970)

Using distillation and microdiffusion techniques for separating the fluorine, followed by colorimetric determination at 540 nm., the authors investigated the fluorine content of seafoods, fruits, and beverages. The range, in parts per million, of values found for the seafoods is listed below.

Seafoods	Fluorine content (p.p.m.)	Seafoods	Fluorine content (p.p.m.)
Fresh snake mackerel	3.19 - 3.89	Clam (Venus sp.)	1.73 - 1.83
Canned bluefin tuna (in oil)	3.52 - 4.00	Mussels	1.34 - 1.57
Canned anchovy (in oil)	2.83 - 3.18	Pink shrimp	2.27 - 2.53
Sardine (Clupea fuegensis) (in oil)	4.12 - 4.40	Sea urchin	2.87 - 3.20
Hard clams (Mesodesma donacium)	3.15	Fresh Chilean hake	3.73 - 4.34
Crayfish (Cervimunida johni)	1.99 - 2.18		

9.6 KEY TO MAN'S FUTURE

Hartley, Sir Harold (British National Committee for the History of Science) (reviewer)
Resources and Man: A Study and Recommendations by the Committee on Resources and Man of the National Academy of Sciences National Research Council
W. H. Freeman (publisher), 7 Cromwell Road, London, SW7, England, 259 pp. (n.d.) 56s and 24s.
New Scientist 46, No. 701, 344 (May 14, 1970)

This book covers all the material resources--food, metals, and energy--upon which future populations must rely. The chapter on food from the sea effectively disposes of the myth that the sea is a limitless source of world energy; although the sea is an excellent source of supplemental proteins, it is an unimpressive source of calories. Moreover, it is no mineral cornucopia. The key to solution is population control. The period of rapid population and industrial growth that has prevailed during the last few centuries, instead of being the normal order of things and capable of continuance into the indefinite future, is actually one of the most abnormal phases of human history--it represents only a brief transition between two very much longer periods, each characterized by rates of change so slow as to be almost a period of nongrowth. The coming period of nongrowth, though it poses no insuperable physical or biological problems, will entail a fundamental revision of the economic and social thinking that assumes the growth rates characterizing the current period can and will be permanent.

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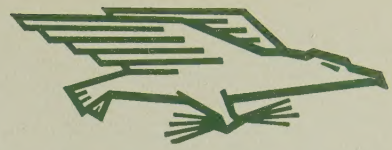

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